

USER'S MANUAL | SLIT LAMP

SL 1400



LUXVISION®
PRECISION INSTRUMENTS

Notification

Dear Users,

Thank you for your purchase of SL 1400 Slit Lamp. Please take time to read our user's manual carefully before use.

This guarantees you to make full use of this unit and prolongs the operation life of this unit.

Precautions

If you have detected abnormal heat, smoke, noise or smell, immediately stop using the product.

In the event of an abnormality, turn off the power and disconnect the power plug from the power socket. Continuing to use the product may result in electric shock or fire.

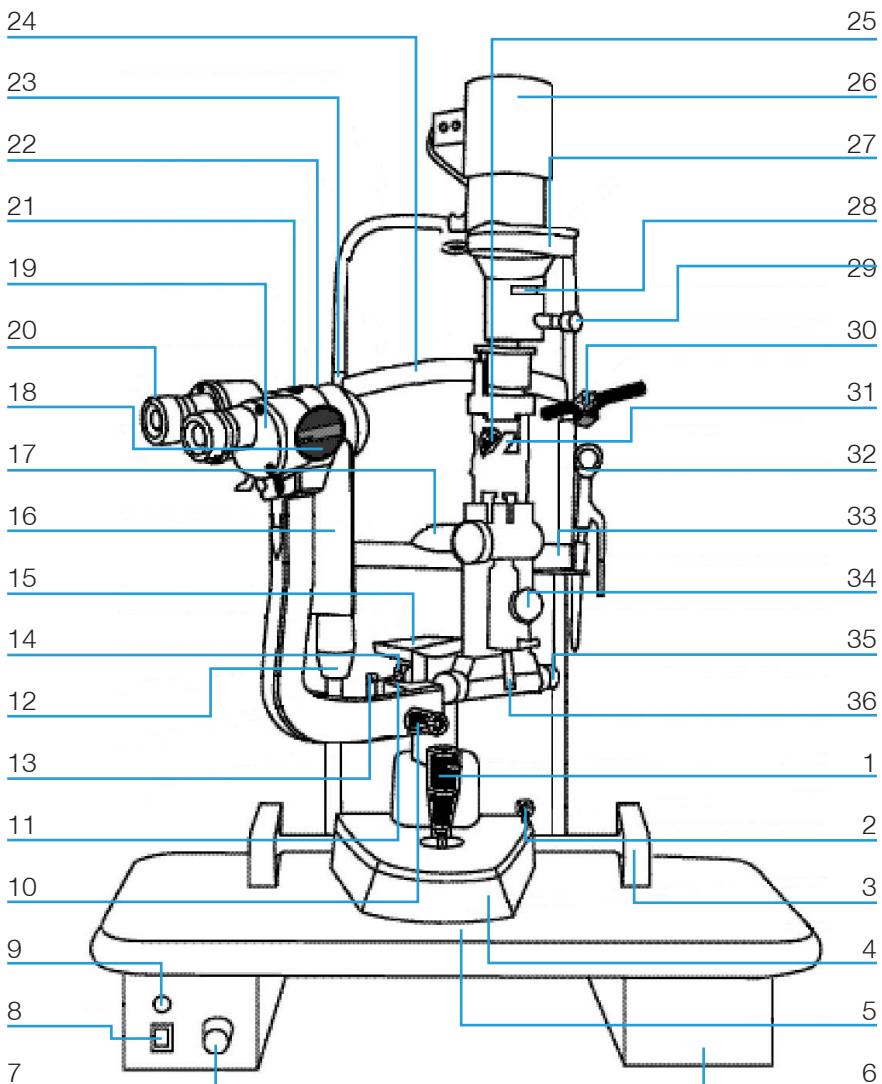
Observe the instructions given below regarding the power cable:

- Be sure to use the supplied or specified power cable.
- Do not modify, forcibly bend, kink or pull the power cable.
- When disconnecting the power cable from the AC outlet, be sure to hold the cable by the plug.
Pulling the cable may cause wire breakage or short circuit, resulting in fire or electric shock.
- Do not connect or disconnect the plug of the power cable to/from the AC outlet using wet hands.
Doing so may result in electric shock.
- Do not touch the product with wet hands while the power cable is connected to the AC outlet.
Doing so may result in electric shock.
- If the product will not be used for a long period, disconnect the power cable from the power source. Leaving the cable connected to the power socket for a prolonged period will consume electricity and may result in heating.

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1. Name of Parts



1. Joystick

Incline joystick slightly to move the instrument in the horizontal plane and rotate it to adjust the elevation of the microscope.

2. Base Locking Screw

The base will be locked when this screw is tightened.

3. Rail Cover

Protects the rail surface

4. Base

Supports the microscope and the illumination arms with the joystick controlling its movement.

5. Work Table**6. Accessory Drawer**

Stores the focusing test rod and other accessories.

7. Brightness Control Switch

Two levels are available – H (HIGH), N (NORMAL). Avoid working continuously at the high setting, as the service life of the bulb will be shortened.

8. Main Power Switch**9. Pilot Lamp****10. Microscope Arm Locking Knob**

Prevents rotational movement of the microscope arm.

11. Angle Mark Ring

Marks on the angle mark ring of the illumination arm align to the long mark on the microscope arm. When 0 on the ring aligns to the short mark at one side of the user, the right eyepiece may be obstructed, and the side of the patient the left eyepiece.

12. Chin-rest Elevation Adjustment Knob

Rotate the knob to adjust the elevation of the chinrest.

13. Location Roller

When the roller is in the middle, the included angle between the microscope arm and the illumination arm is 0°, when it is to the right or left the included angle is 10°.

14. Microscope and Illumination arm Coupling Bolt

Tightening this bolt permits the illumination arm and the microscope arm to be rotated simultaneously. Loosening the bolt allows the illumination arm and microscope arm to rotate separately.

15. Hruby Lens Guide Plate

The plate is also used for the applanation tonometer.

16. Microscope Fixation Screw**17. Chin-Rest****18. Magnification Select Dial**

Five magnifications are provided.

19. Prism Boxes

The prism boxes are used to adjust the interpupillary distance.

20. 12.5x Eyepiece

Before use, adjust the diopter ring for each eyepiece to get a clear image.

21. Microscope Fixation Screw**22. Accessory Mount**

The accessory mount will accept the Model R-900 Goldmann applanation tonometer in addition to other accessories.

23. Horizontal Mark

The horizontal center of the patient's eye is aligned to the mark by changing the elevation of the microscope using the joystick.

24. Forehead Belt**25. Diffusion Lens**

The diffusion lens is used for photographing at low magnifications and for enlarging the field of magnification.

26. Lamp Cap**27. Aperture height and display window****28. Filter Selection Lever**

There are four filter selections.

29. Aperture and Slit Height Control Knob

Rotate this knob to adjust the spot and the slit height. Turn the knob horizontally to rotate the slit.

30. Fixation Target

An illuminated fixed spot for patient to look at.

31. Reflecting Mirror

Both long and short reflecting mirrors are provided.

The long mirror is used for most examination procedures.

The short mirror is used when the long mirror interferes with the optical path as may happen a during funduscopy.

32. Hruby Lens

Used for observation of fundus and the posterior segment of the vitreous body.

33. Hruby Lens Holder**34. Centering Knob**

Loosening the knob allows the illumination light to be moved from the center of the field of vision for indirect retro-illumination. Tightening the knob brings the illumination light back to the center.

35. Slit Width Control Knob

The slit width is continuously adjustable from 0 to 9mm.

2. Assembly

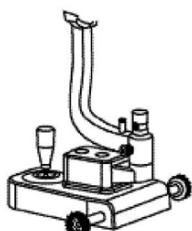
2.1 Components



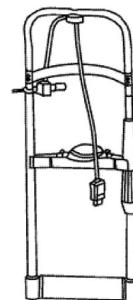
A



B



C



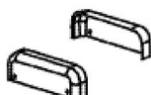
D



E



F



G



H



I



J



K



L



M



N



O



P



Q



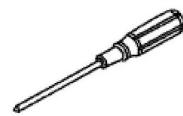
R



S



T



U



V



W



X

	Name	Quantity
A	Illumination Part	1
B	Microscope (with 10x eyepieces)	1
C	Base Part	1
D	Head-Rest Part	1
E	Breath Shield	1
F	Worktable with Power Box	2
G	Rail Cover	1
H	Input Power Cable	1
I	Hruby Lens	1
J	Hruby Lens Guide Plate	2
K	Spare Main Illumination Bulb	1
L	Chin-Rest Paper	1
M	Focusing Test Rod	1
N	Protection Cap	1
O	Dust-Proof cover	1*
P	Fixation Target	1
Q	Spare Long Reflecting Mirror	1
R	Spare Short Reflecting Mirror	1
S	Brush	1
T	Spare Fuse	2
U	Phillips Screw Driver with wood handle	1
V	Watch Screw Driver (big)	1
W	Watch Screw Driver (small)	1
X	Spanner	1

(*Optionally available in some region)

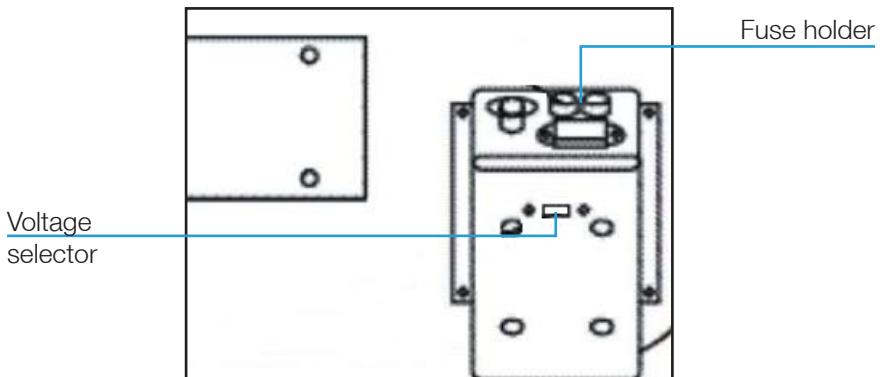
2.2 Assembly Procedure

Phillips Screwdriver with wood handle (U)

Watch screwdriver (V)

Wrench (X)

1. Selecting voltage and fuse



Selector voltage and fuse

- Check the setting on the voltage selector located on the bottom of the power box. If it doesn't match with the input voltage, slide it to the proper position with screwdriver (V).
- Open the fuse holder with screw driver (U) and take out the fuse, ensure that its rated value corresponds to the mains voltage:

110 Volt.....1A
220 Volt.....0.5A

The 220 V- 0.5 A is installed by the factory.

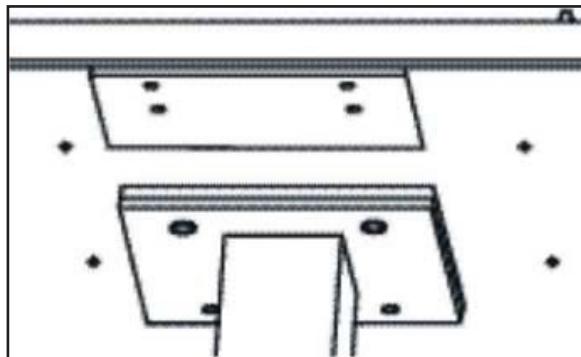
Important Matters

Set the input voltage and frequency of the instrument according to that of the mains.

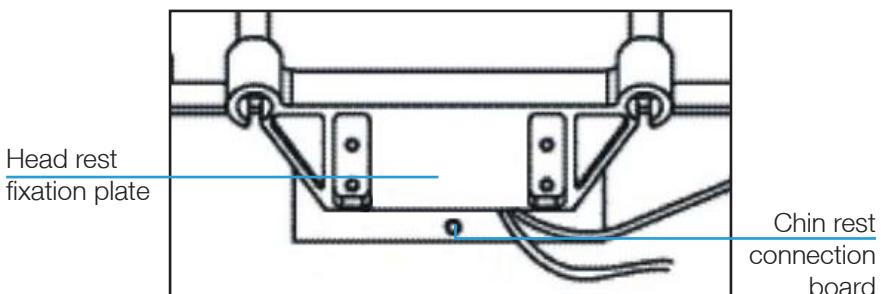
2. Assembling the worktable (F)

- To attach the worktable on the LSL1400 motorized instrument table, please unscrew the four M8x20mm bolts with spring washers with the wrench (X).
- Align the worktable screw hole to the assembly hole of the instrument table.

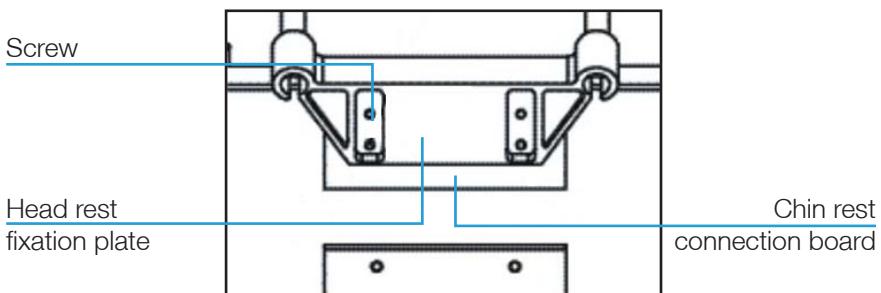
- Place the worktable so that the power panel faces the user, then refasten the bolt securely with the wrench.



3. Assembling the Head-rest Part (D)

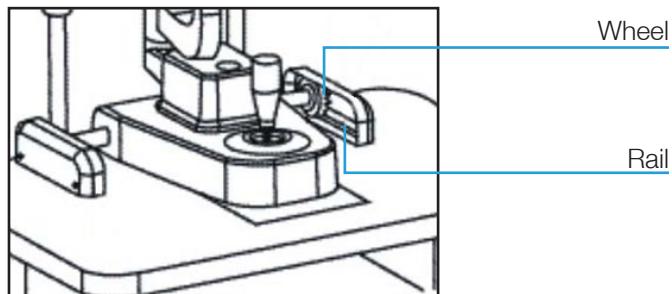


- Remove the four screws attached to the chinrest connection board with the screw driver (U).

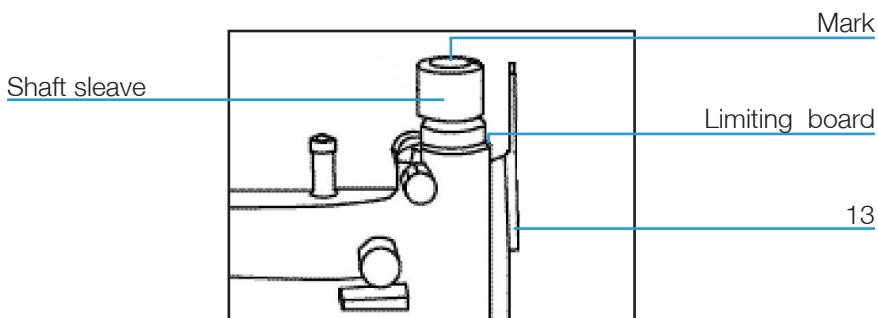


- Put two cables in the gap between the headrest fixation plate and the chin-rest connection board.
- While ensuring the cables are not compressed, retighten the previously removed screws.

4. Assembling the base part (C) and the rail covers (G)



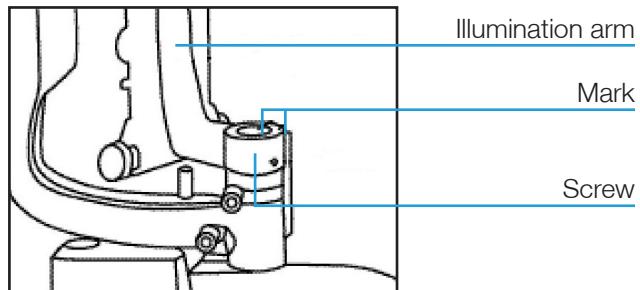
- Place the wheels of both sides of the base (C) on the rails on the worktable
- Check whether the wheels can be rolled smoothly on the rails.
- Remove the four screws attached to the rail with the screw driver (W).
- Place the rail cover (G) to the rail and retighten the previously removed screws.



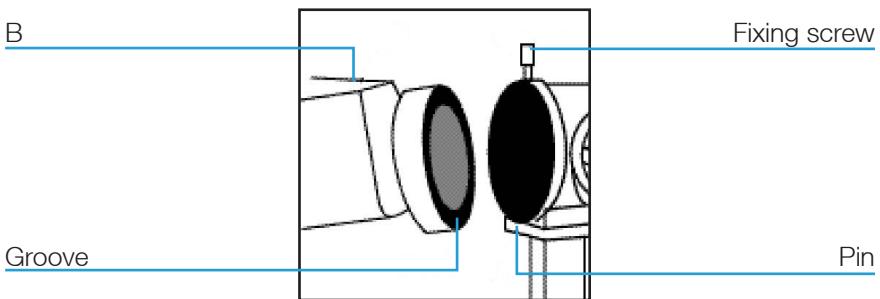
5. Assembling Illumination part (A)

- Loosen the illumination arm bolt (13).

- Rotate the brass shaft sleeve to make the angle of the red mark and the illumination arm between 30° and 90°.
- Loosen the screw on the illumination arm with the screwdriver (V). Align the assembly hole of the illumination arm to the brass shaft sleeve and lower carefully, while simultaneously aligning the two red marks.



- After the two red marks are accurately aligned, retighten the screw.



6. Assembling the binocular tubes (B)

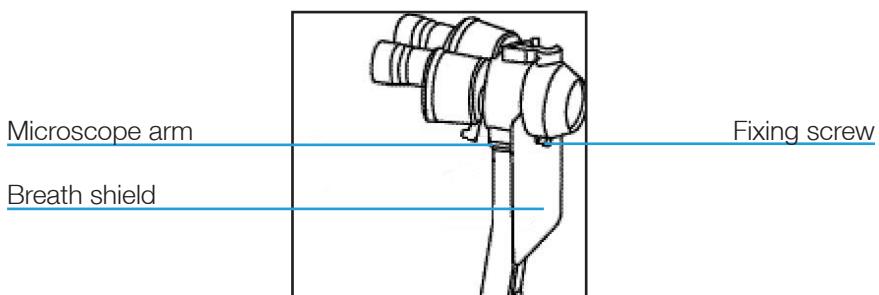
- Align the groove on the binocular tubes with the pin on the microscope body.
- Tighten the fixing screw.

7. Assembling the breath shield (E)

Important Matters

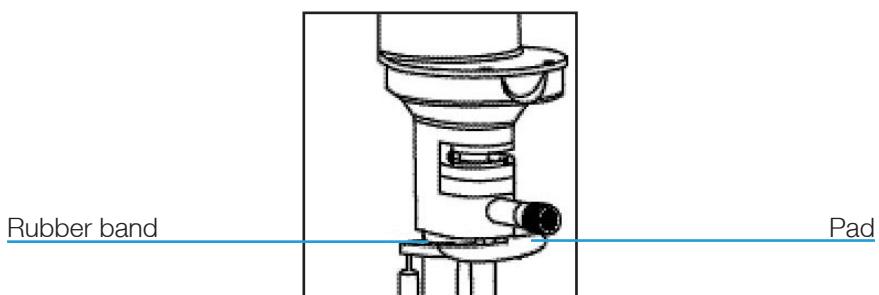
Avoid touching any lens surface while assembling the breath shield (E).

- Remove the breath shield fixation screw from the microscope arm.
- Pass the removed screw through the hole of the breath shield then re-screw it into the arm.



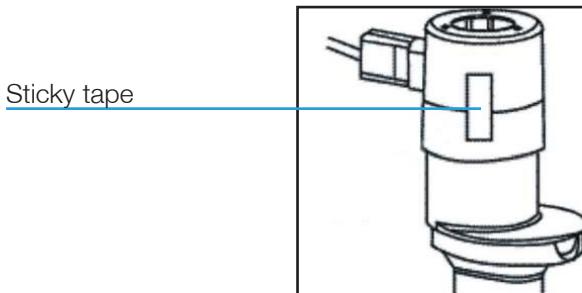
8. Removing the illumination part shipping pad

- This pad is used to protect the slit mechanism of the illumination part during shipping.
- Remove the rubber band and gently pull the pad out.

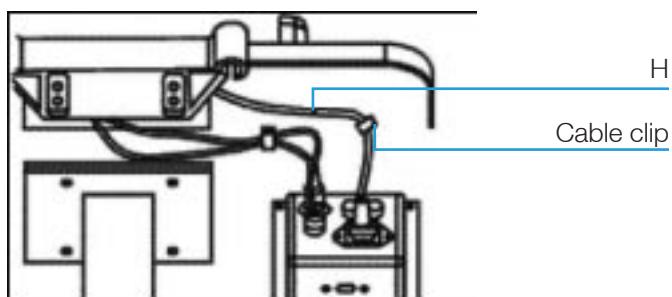


9. Connecting Plug

- Remove the sticky shipping tape from the cap. The tape ensures that the cap is remains fastened to the lamp base during transportation.



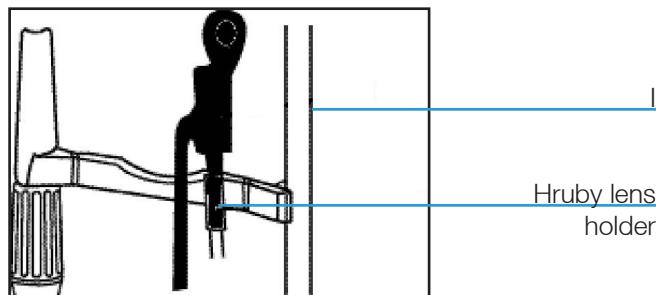
- Insert the plug on the top of the headrest part (D) into the socket of the lamp cap (26) on the illumination part (A).
- Connect the two plugs below the headrest part with the corresponding output sockets of the power box.
- Insert the plug of the input power cable (H) into the input socket of the power box.



- Remove the cable clips from the bottom of the worktable with screwdriver (J) and route the output and input cables through them, then re-attach them to the bottom of the worktable.

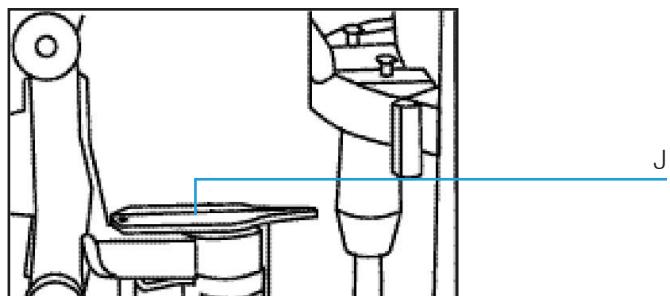
10. Assemble the Hruby Lens (I)

- Insert the Hruby lens (I) into the Hruby lens holder (26) on the headrest part. Be careful not to touch the lens surface.
- Place the Hruby lens guide plate (J) into the main shaft hole of the base part with the small end pointed at the headrest part.

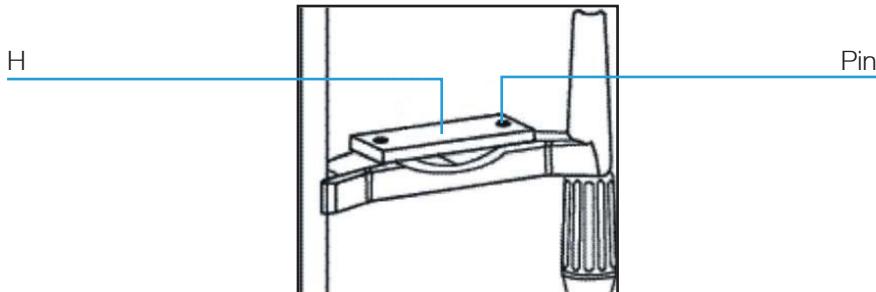


11. Assembling the chin-rest (E)

- Pull out the two fixing pins from the chinrest.

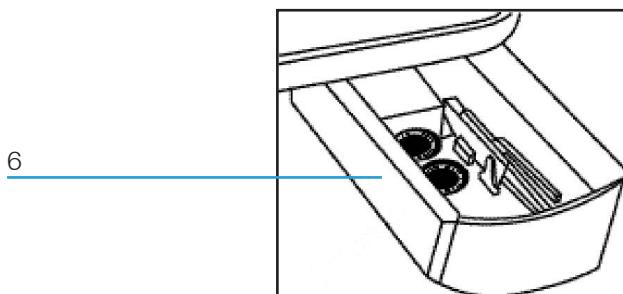


- Remove and discard the packaging for the chin-rest paper and position the paper.
- Insert the fixing pins through the holes.



12. Storing spare parts

Spare parts may be stored in the accessory drawer.



2.3 Inspection procedure after assembly

1. Power plug

- This instrument supplied with a 3-wire grounded line cord. Do not remove or disconnect the ground. Please select proper power sockets and plugs
- Always ensure that the instrument is well grounded.

Important Matters

Please use the special cable supplied with this instrument.

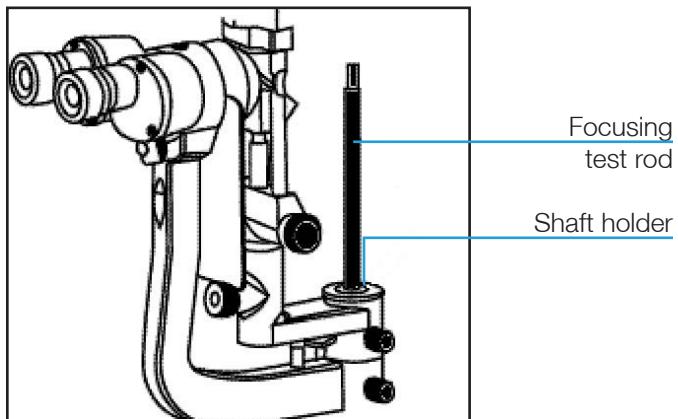
2. The power box and the illumination part

- When the main power switch (8) of the power box is placed at “1” it turns on, and when located at “0” it turns off. The main power switch should be set to the “0” position before connecting the input cable with the power socket.
- Turn on the main power switch, and the pilot lamp (9) will illuminate. Open the slit width control knob (35) to examine the illumination.
- Press the brightness control switch (7) in each of the two positions, the brightness should be change accordingly.
- Check the fixation target device to confirm it is lit.
- Check that all the movable parts such as aperture and slit height control knob (29), filter selection lever (28), and magnification lever (18), etc. move freely.
- After inspection, turn off the main power and cover the instrument with the dust cover (O).

3. Operation

3.1 Diopter compensation and pupillary distance adjustment.

1. Use of the focusing test rod (M)



The focusing test rod is used to confirm that the microscope is adjusted correctly. Insert it into the main shaft hole with the flat surface facing the objective lens in the direction of the user.

Important Matters

After adjustment, remember to remove the rod and insert the protective cap.

2. Brightness adjustment

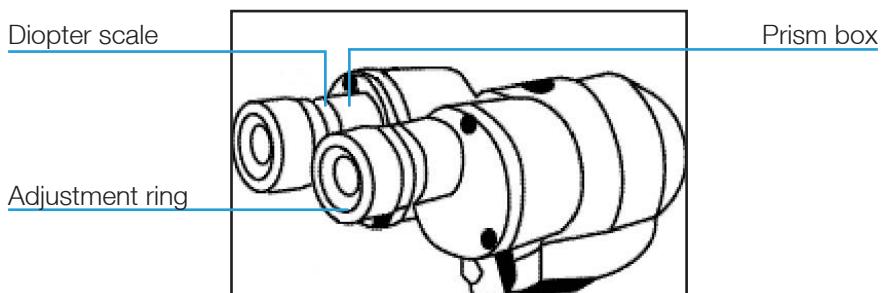
Turn on the main power switch and set the brightness control switch (7) at the "N" position. Turn the slit width control knob (35) to make the slit width between 2 and 3mm.

3. Diopter compensation

The focus of the microscope is calibrated according to the emmetropia. If the user is ametropic, he should adjust the eyepiece diopter.

Adjustment should be performed as follows:

- Rotate the diopter adjustment ring (19) counter clockwise until it stops.
- Rotate the ring clockwise until a sharp slit image appears on the focusing test rod.
- Adjust the other eyepiece using the same procedure.
- Record the diopter value on each eyepiece for future reference.



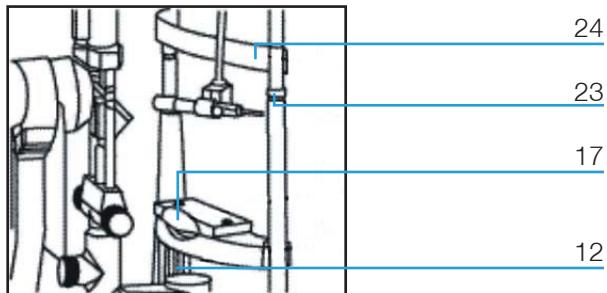
4. Pupillary distance adjustment

Separate the prism boxes of the microscope with both hands to adjust the pupillary distance until both eyes can stereoscopically see the same image on the focusing test rod.

3.2 Patient position and fixation target

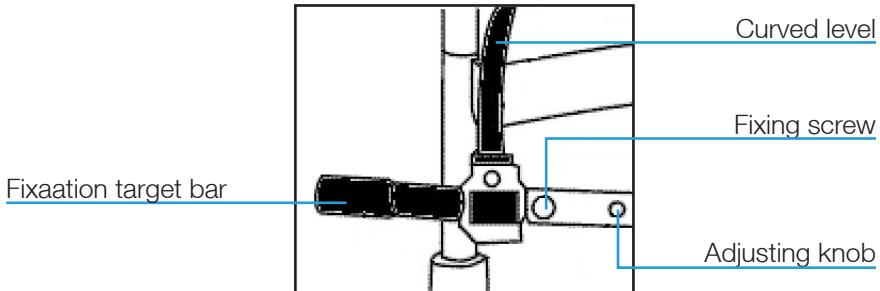
1. Positioning the patient's head

Have the patient place his chin on the chin-rest (17) and the forehead against the forehead belt (24). Adjust the chin-rest elevation adjustment knob (12) below the chin-rest until the patient's canthus aligns with the horizontal mark (23).

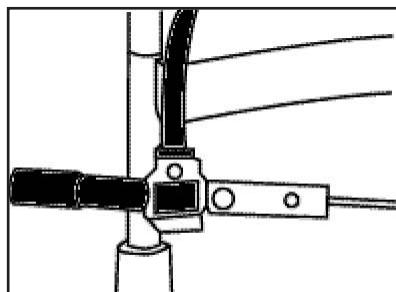


2. Use of the fixation target

- Direct the patient to look at the fixation target (30) with the eye not to be examined. To change the fixation position, move the lamp bar and curved lever around the headrest.
- The fixation target with diopter compensation supplies a dot and concentric circles target. Slide the knob to adjust the diopter compensation from -15D to +10 D.



The fixation target with the spot light is intended for the patient whose diopter exceeds – 15D. When changing, just loosen the fixation screw, replace the fixation target with the spot light source and tighten the fixation screw.



3.3 Base operation

1. Horizontal coarse adjustment

Keeping the joystick (1) straight up, move the base (4) to coarsely align the microscope in the horizontal plane.

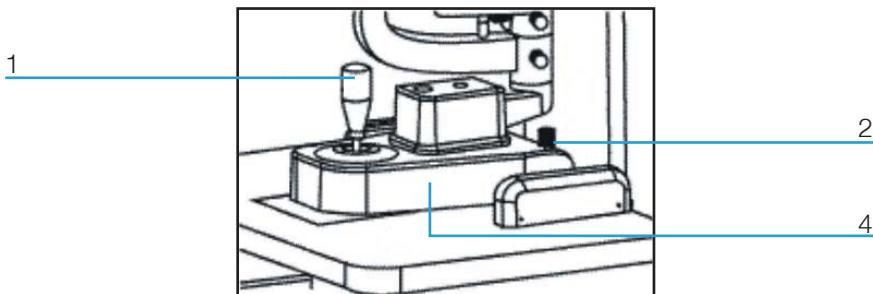
2. Vertical adjustment

Rotate the joystick to adjust the microscope's height until it aligns with the target. Turn the joystick clockwise to raise the microscope and counter clockwise to lower it.

3. Horizontal fine adjustment

Tilt the joystick to make the microscope move slightly in the horizontal plan.

While watching through the eyepieces, tilt the joystick to align the microscope at the object for a sharp image.



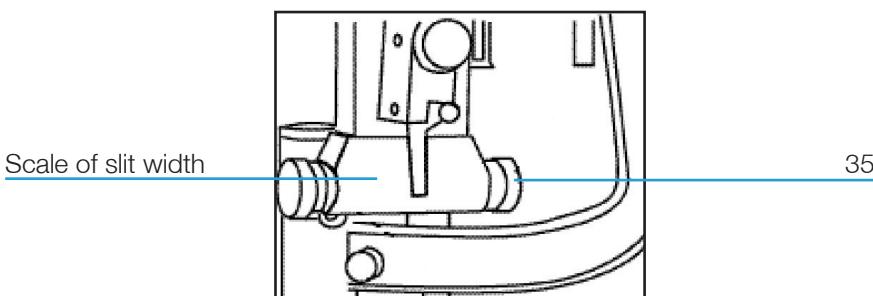
4. Locking the base

When finishing the adjustment, fasten the base locking screw (2) to lock the base (4) and prevent it from sliding.

3.4 Illumination parts operation

1. Changing the slit width

Turn the slit width control knob (35) to adjust the slit width from 0 to 9mm. The slit becomes a circle at the 9mm size.

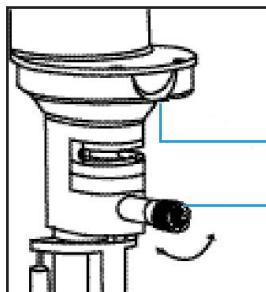


2. Changing the aperture and slit height

Turn the aperture and slit height control knob (29) and 6 different circular beams of light are available at full aperture: 9, 8, 5, 3, 1, 0.2mm diameters

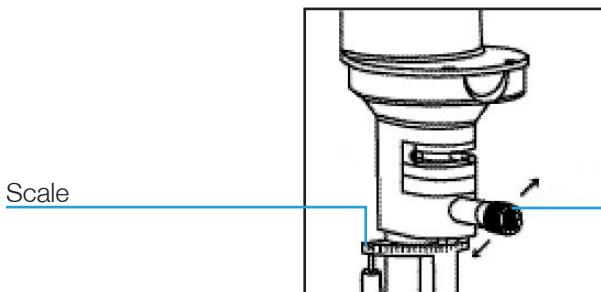
respectively.

With a slit image, the slit height can be changed continuously from 1 to 9mm, which is indicated by the display window (27).



27

29



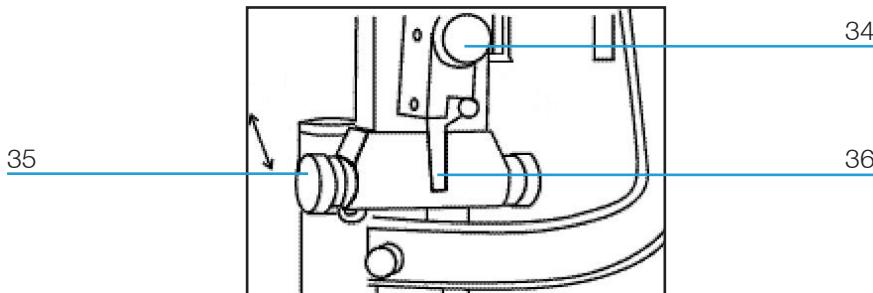
29

3. Rotating the slit image

Swing the aperture and slit height control knob (29) horizontally to revolve the slit image at any angle from vertical to horizontal. The rotation angle scale indicates the angle of image rotation with small divisions for 5° and large divisions for 10°.

4. Deflecting the illumination light

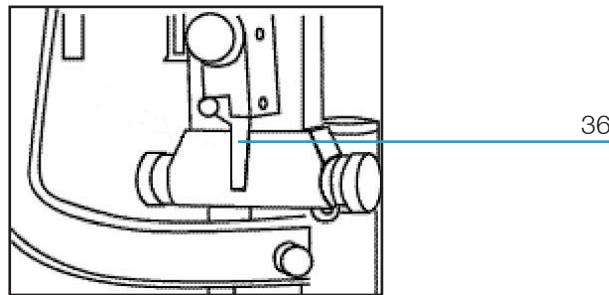
Loosen the centering knob (34) and swing the slit width control knob (35) in the shown direction, so the light spot moves away from the center of the microscope's field of vision.



This feature is used primarily for examination by indirect retro-illumination. Tighten the centering knob and the slit light will return to the center of the microscope's field of vision.

5. Oblique Illumination

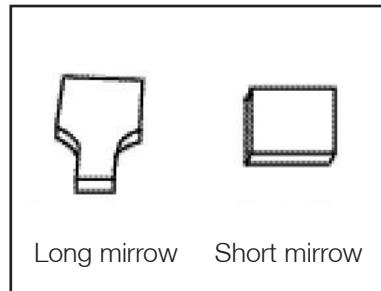
Oblique illumination is used for sectional or fundus examination by use of a contact lens. Press down the inclination lever so that the illumination part may incline to 20° (5° of each division). Since the illumination part may touch the patient's head, operate carefully.



6. Reflecting Mirror

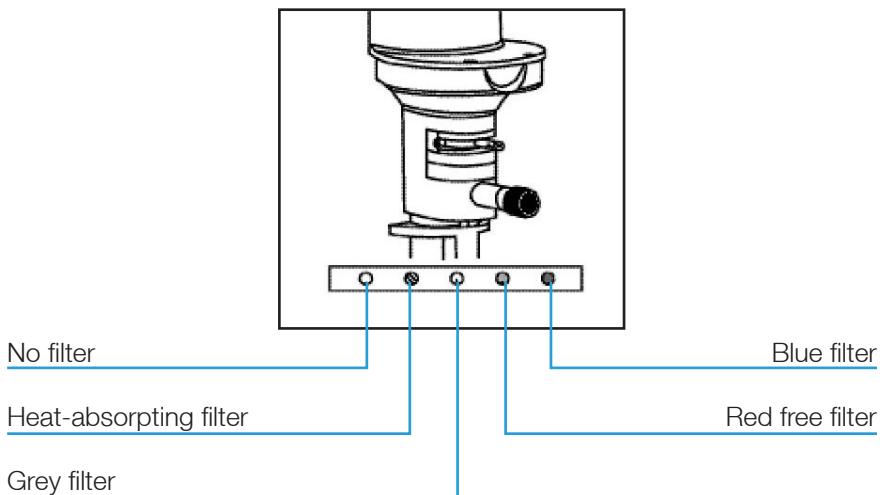
Both short and long reflecting mirrors are supplied with this instrument. Use the long mirror for normal examination. When the angle between the illumination part and the microscope is between 3° to 10° the image may become obstructed.

The short mirror is also used when the illumination part is inclined over 10°.



7. Filter selection

Move the filter selection lever (28) in the horizontal plane to add or remove the four filters in the illumination path. Usually the heat absorption filter is used so that the patient may feel more comfortable during a long examination.



3.5 Fundus observation with the Hruby lens

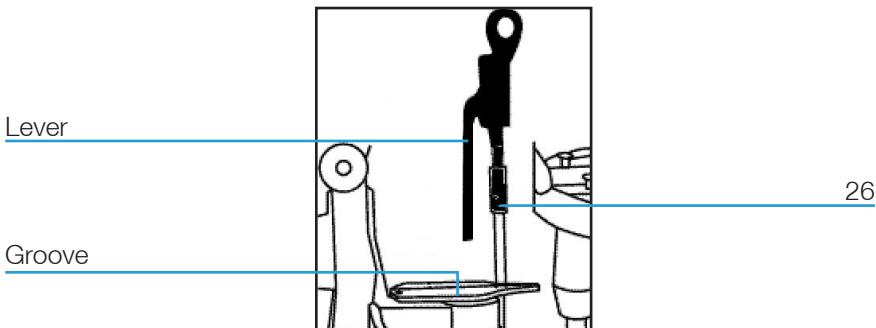
In routine use, observation of the eye is limited to the area from the cornea to the anterior portion of the vitreous body. This is because of refraction effects of the cornea and crystalline lens. However, with the Hruby lens (I) in the front of the microscope, the posterior part of the vitreous body and fundus can be observed.

To use Hruby lens proceed as follows:

1. Dilate the patient's pupil for about 20 minutes.
2. Insert the Hruby lens guide plate (15) into the main shaft hole of the illumination arm and the microscope arm.
3. Pull out the Hruby lens holders from one side of the headrest. Move the Hruby lens holder toward user so that it can slide freely to the left and right below the chin-rest. Insert the lower end of Hruby lens lever into the groove on the guide plate.
4. Focus the illumination light and the microscope on the patient's eye.
5. Move the lever to locate the Hruby lens at the center of the field of vision and near the patient's eye.
6. Move the lever to focus the Hruby lens at the fundus, and then adjust the slit height and width to reduce the unnecessary interference light in the field of view.
7. To examine different parts, either turn the microscope and the illumination arm or change the patient's fixation by manipulating the fixation target.
8. If the long mirror interferes in the examination, just replace it with a short mirror.
9. After examination, move the Hruby lens back to the original position on one side of the chin-rest.

Important Matters

Before moving the Hruby lens to the right and left, first have the patient's head move away from the chinrest to avoid his nose touching the Hruby lens



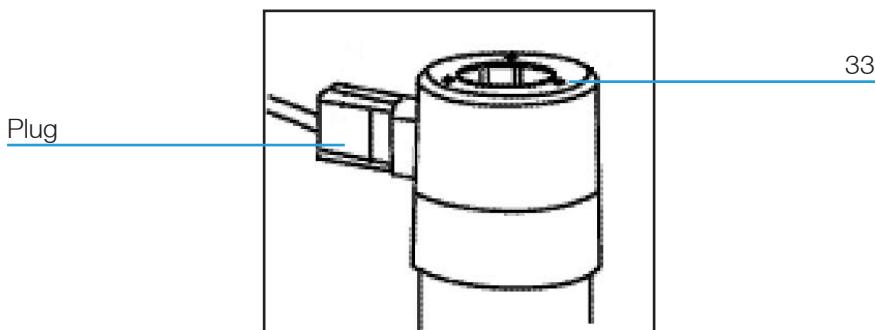
4. Maintenance

Important Matters

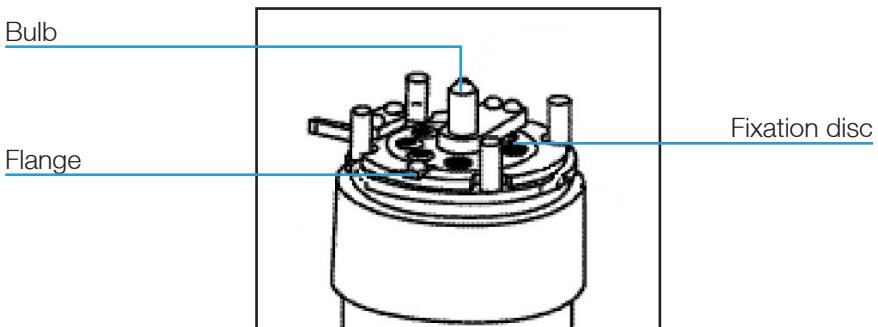
Dispose of replacement parts in accordance with local regulations.

4.1 Replacing the illumination bulb

- Turn the main power switch (8) off.
- Unplug the connector on the lamp housing.
- Rotate the lamp cap (26) counter clockwise and remove it from the illumination part (A).



- Remove the old bulb and replace it with a new one. The groove in the bulb fixation disc should be aligned with the flange of the lamp base. Improper alignment may cause uneven illumination.



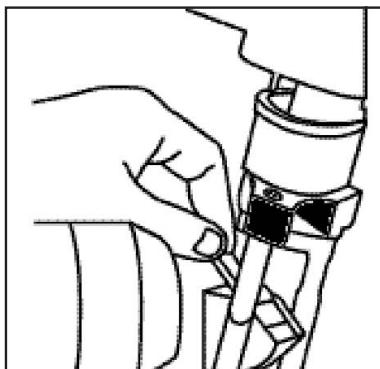
Important Matters

The bulb is hot

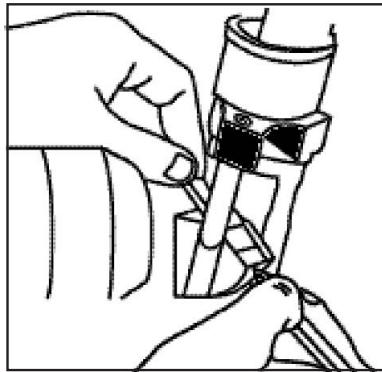
- Place the lamp cap in the original position and rotate it clockwise and insert the connector.
- Turn on the main power switch and ensure that the new bulb illuminates.

4.2 Replacing the reflecting mirror

- Set the angle between the microscope and the illumination arm to exceed 30°.

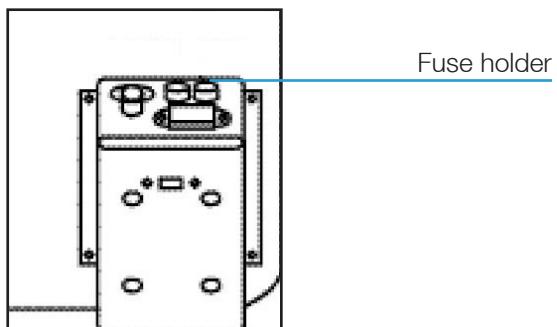


- Incline the illumination arm more than 10°.
- Remove the long mirror by holding the extended surface.
- Insert new long or short reflecting mirror.



4.3 Replacing the fuse

- Turn off the main power switch (8) and unplug the power cord from the power socket.
- Unscrew the fuse holder cover with the screw driver (U).



- Remove and replace the fuse, replace the fuse cover.
- The fuse specifications are as follows:

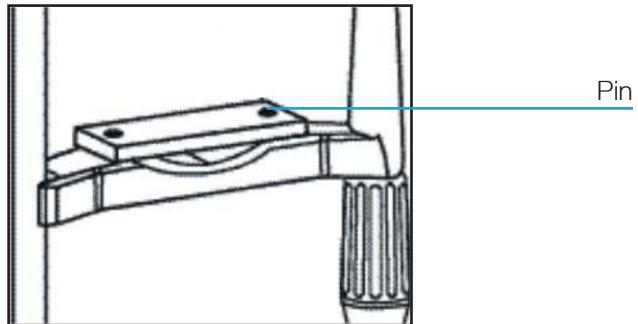
110V	1A, 250V
220V	0,5A, 250V

Important Matters

Please select the fuse of the same type, specification and rated value.

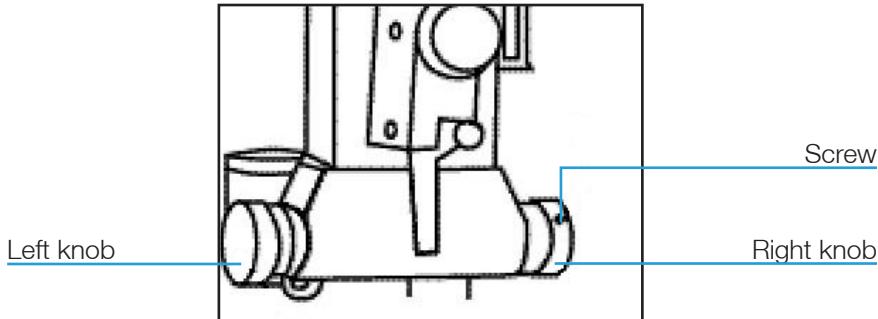
4.4 Replacing the chin-rest paper

When the paper is exhausted, remove the pins by pulling them upward out of the chin-rest. Install a new package of paper and replace the pins.



4.5 Adjusting the tightness of the slit width knob

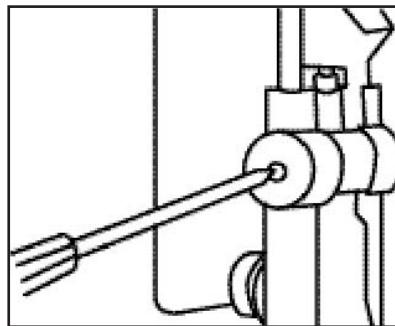
If the slit width control knob is too loose, the slit width may change. Loosen the screw on the right knob with the screw driver (W), and then hold the left knob firmly with one hand, while rotating the right knob clockwise for tightening.



When the desired tightness has been achieved, tighten the locking screw on the right knob.

4.6 Adjusting the inclination of the illumination part

If the inclination mechanism of the illumination part is too loose, tighten the screws on both sides of the pivot point with the screw driver (U).



4.7 Cleaning

1. Cleaning the lenses and mirrors

Remove any dust on the lenses or reflecting mirrors by brushing them with the supplied brush (S). If any dust remains, remove it with soft cotton moistened with absolute alcohol.

Important Matters

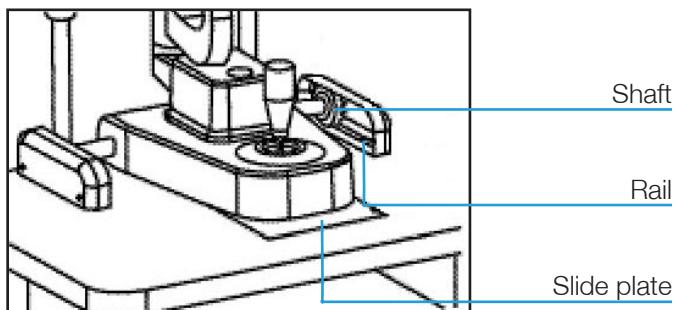
Never touch the lenses of mirrors with your fingers or any hard materials.

2. Cleaning the slide plate, rail and shaft

Wipe the dirty segment with clean soft cloth.

3. Cleaning the plastic parts

Clean the plastic parts such as the chin-rest bracket and forehead belt with soft cloth moistened with a mild detergent or water. Disinfect patient contact surfaces with isopropanol.



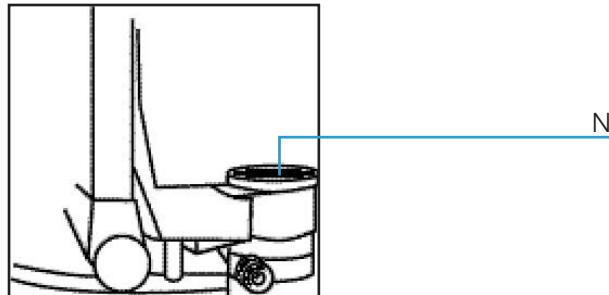
Important Matters

To prevent damage to surfaces do not use corrosive cleaners.

4.8 Protection of Equipment

Always ensure that the protective cap (N) is installed over the main shaft hole during operation. This will prevent the ingress of dust and physiological fluids that could cause improper operation. Only remove the dust cap when assembling, disassembling, or repairing the instrument.

When not in use always cover the instrument.



4.9 Consumable Parts

Please specify names and quantities when ordering following consumable parts.

SL 1400 Slit Lamp	Part name	Outlook
	Illumination Bulb	
	Short Mirror	
	Long Mirror	
	Chin-rest paper	
	Fuse 1 A (110 V) Fuse 0,5 A (220V)	

5. Common Trouble Shooting

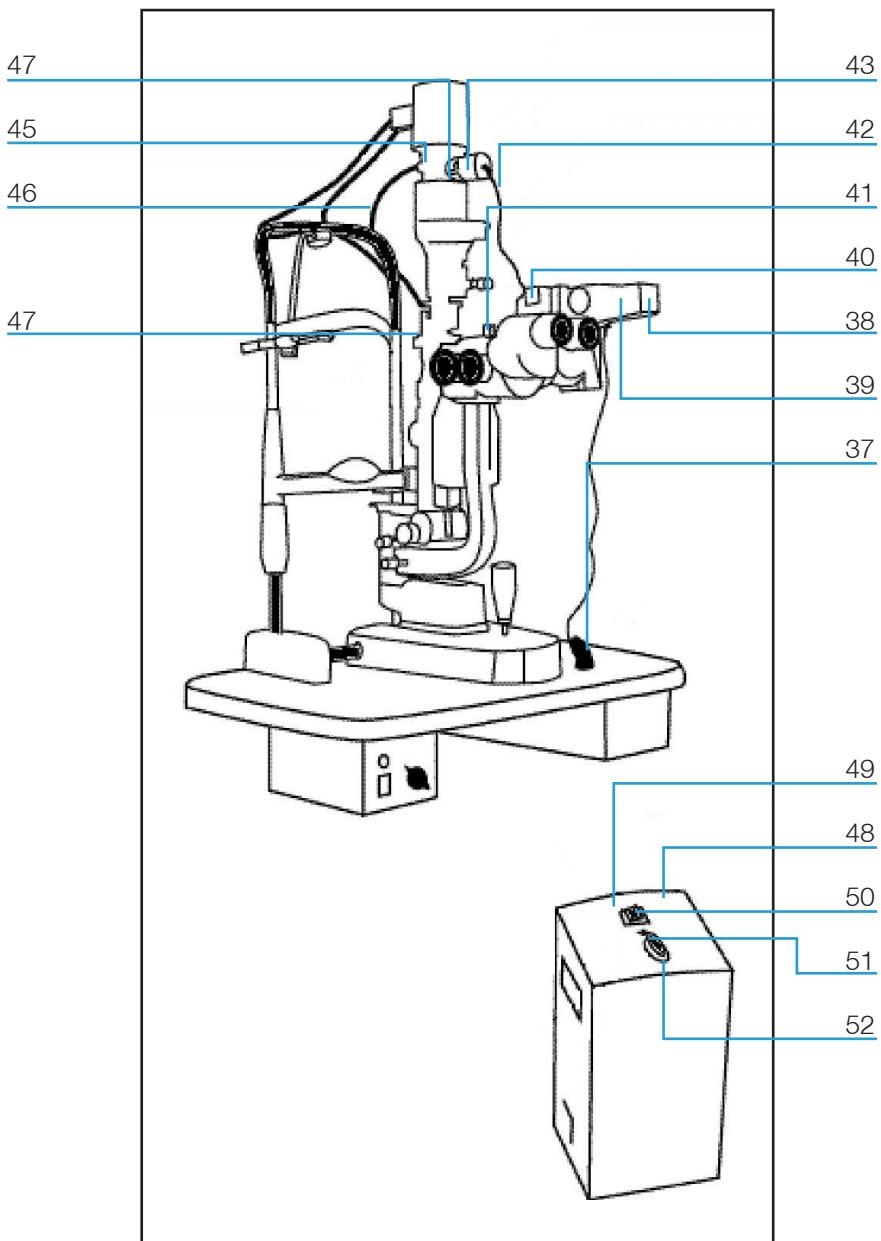
In case there is any trouble, please refer to the following table. If the equipment still doesn't work, please contact the Repair Department or an authorized distributor.

Trouble	Possible Cause	Remedy
No illumination	The cable isn't connected correctly with the power socket	Connect the power cable correctly.
	The main power switch is on the "O" position	Place the switch on "1" position.
	The plug on the power box is loose	Insert the plug firmly.
	The plug in the lamp cap is loose	Insert the plug firmly.
	The bulb has burned out	Change the bulb.
	The fuse has blown	Change the fuse.
Slit is too dark	The bulb is not assembled properly	Assemble the bulb properly.
	The filter lever is in the middle position or in the position of the gray filter	Set the filter lever to the correct position.
	Voltage selector is wrongly set	Set the voltage selector correctly.
	The coating on the reflecting mirror is oxidized.	Change the reflecting mirror.
	Too much dust on the reflecting surface	Clean the surface with the brush.
Fuse has blown	Voltage selector is wrongly set.	Set the voltage selector correctly.

Trouble	Possible Cause	Remedy
	The fuse doesn't comply with the specification.	Replace it with a suitable fuse.
Slit closes automatically	The slit width control knob is too loose.	Adjust the tightness of the control.
Fixation target position	The output plug is loose.	Insert the output plug firmly.

6. Optional Photographic Attachment

6.1 Name of parts



37. Shutter remote button

Set the button at "S" or "T" position to open the shutter

38. F10-11 Motor drive

Advance film automatically

39. DF-300 Body

The image in the right ocular is photographed

40. Flash lamp mount**41. Photographic attachment detach/attach lever**

Attaches and detaches the photographic attachment to the main body of the slit lamp

42. Synchronizing line**43. Xenon relay cord****44. Xenon lamp****45. Photographic focusing lens mount****46. Background illumination unit****47. Background illumination selection lever**

There are 3 settings: high, low, and fully occluded.

48. Photographic power supply**49. Pilot lamp****50. Main power switch****51. Charge lamp**

When the power supply is completely charged, the lamp illuminates. If an exposure is made when the lamp is not illuminated it will be underexposed. Always check charge lamp before activating the shutter release. Charging of the power supply takes approximately 6 seconds for 240J maximum output.

52. Flash intensity selector dial

5 flash intensities are available. Selection should not be made while the power supply is being charged (charge lamp is off).

53. Shutter speed selector

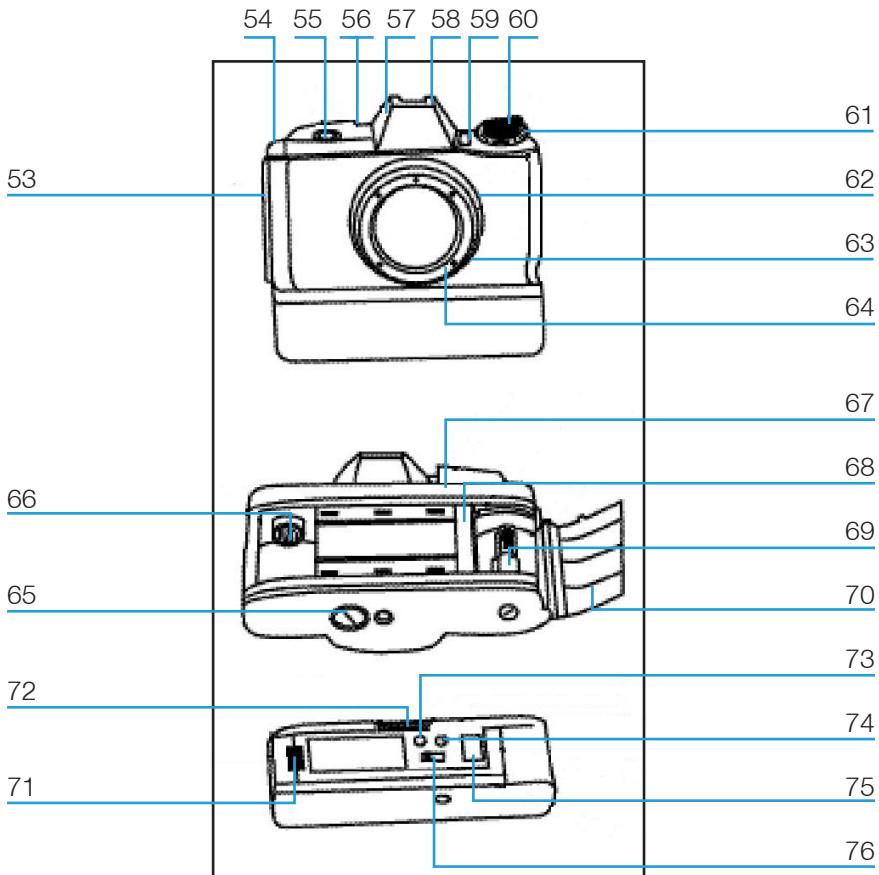
When using the flash, the shutter speed is set at 1/30 second.

54. Frame counter**55. Manual shutter****56. Shutter speed window****57. Lens detach/attach index****58. Accessory outlet****59. Power switch of camera****60. Rewind knob****61. Rewind button**

To open the back cover, lift rewind button.

62. Lens detach/attach button**63. Remote cord socket****64. Bayonet lens mount****65. Battery chamber cover**

To replace the battery, use a coin or similar object to unscrew the battery chamber. Use two 1.55 V silveroxide or two 1.5V alkaline-manganese batteries. Ensure that the plus (+) side faces down.



66. Film Cartridge Chamber

67. Winder crank

When the motor drive is shut off, you can rewind the film by turning this crank.

68. Sprocket

69. Take-up spool

70. Back cover

71. Battery chamber button of the motor drive

To open the battery chamber, press buttons at both sides to remove the cover. Use 4AA size Ca-Mn or alkaline batteries. Ensure that the batteries are installed according to the polarity markings inside the chamber. Press

the switch at the "S" or "C" position, then the lamp illuminates. "S" means single wind, "C" means continuous wind.

72. Fixing Screw

73. Power Indicator

74. Alarm lamp

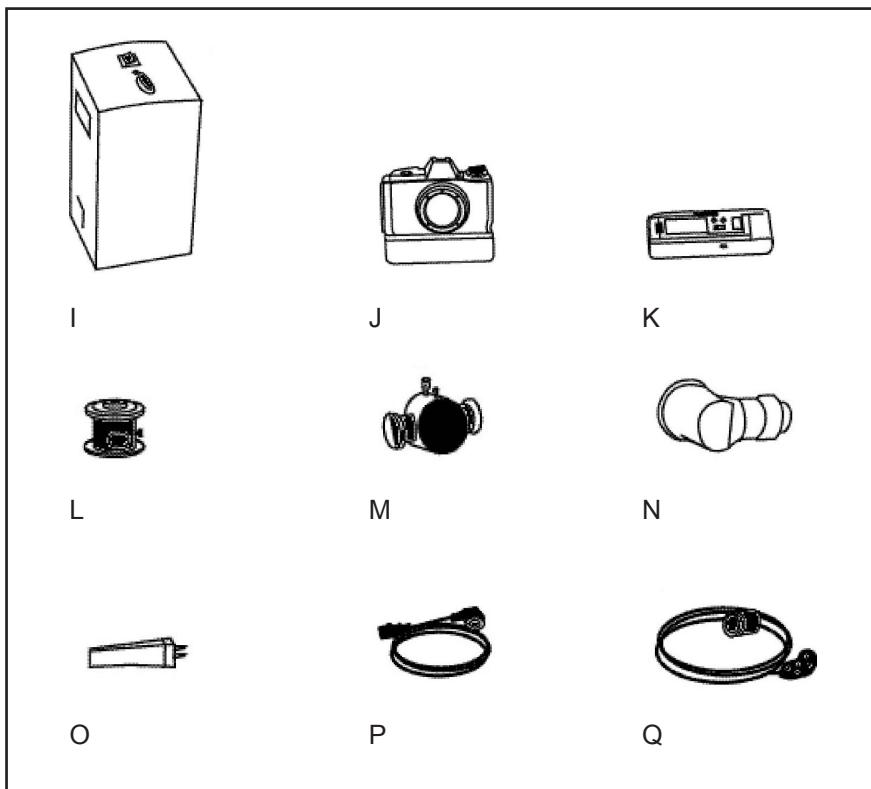
The lamp illuminates while the film advances, after the shutter is closed. When all frames have been exposed, the lamp will still light.

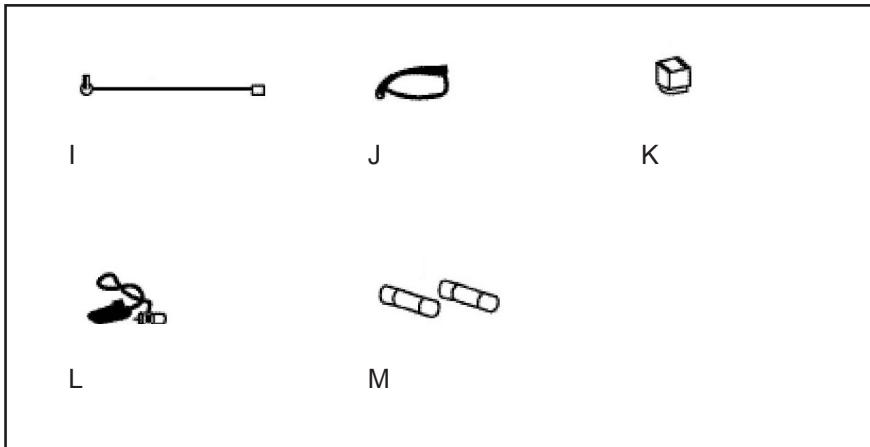
75. Rewind pushing button

76. Motor-driver switch

Turn this switch off to advance the film manually.

6.1 Components



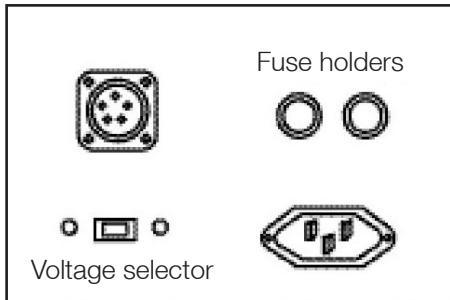


	Name	Quantity
A	Photographic power supply	1
B	DF-300 Body	1
C	F10-11 Motor-Drive	1
D	Relay lens unit	1*
E	Beam splitter	1
F	Special lens for photography	1
G	Xenon lamp	1
H	Power cable	1
I	Xenon relay cord	1
J	Background illumination unit	1*
K	Synchronizing line	1
L	Xenon lamp mount	1
M	Remote shutter line	1
N	Spare fuse	2

*Assembled to the slit lamp

6.3 Assembly

These instructions describe the installation of the photographic unit for LSL 1400 for future reference.



Tools Required

M2 Watch screwdriver
M3 Phillips Screwdriver

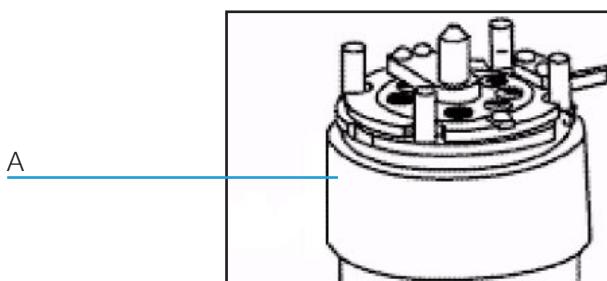
1. Selecting the voltage and fuse

- Check the voltage selector on the power supply. If it doesn't match the mains voltage, slide it to the proper position with screw driver (V).
- Open the fuse holder with the screw driver (U), remove the fuse, and ensure it is the correct value corresponding to the main voltage.

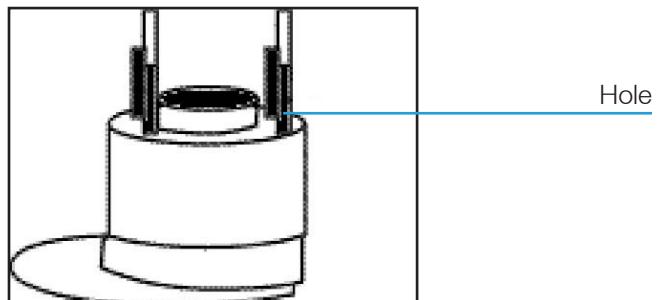
110V.....T3.15A
220V.....T1.6A

2. Assembling the relay lens unit (D)

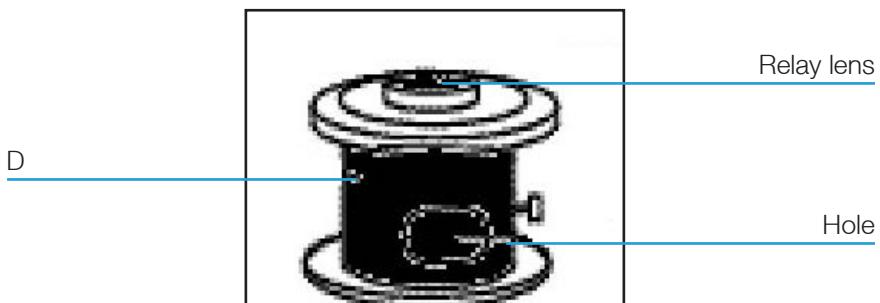
- Turn off power switch (8).
- Remove the connection plug attached to the lamp house cover, turn the cover (26) counterclockwise, and then unplug the illumination unit (A).



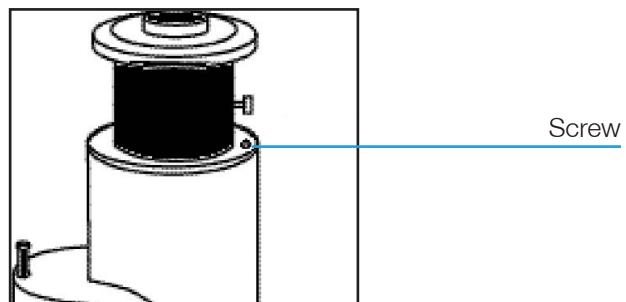
Unscrew the four knurled nuts from the lamp housing, remove the lamp housing and bulb.



- Insert pins in the long screw hole, and unscrew the four screw rods.



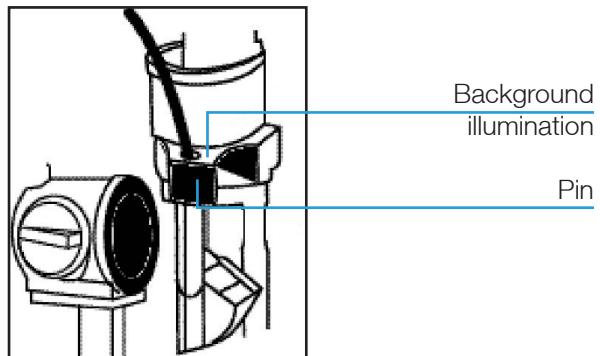
- Mount the relay lens



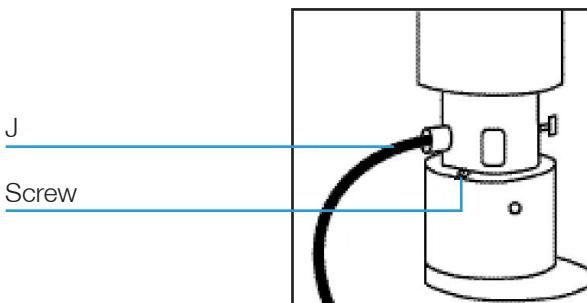
- With the notch on the lamp house facing the user, tighten the four M3 X 10 screws.
- Insert and tighten the four previously removed screw rods into the screw holes in relay lens unit.
- Install the lamp housing and install the knurled nut.
- Install the lamp cover on the previous position, and connect the plug.

3. Assembling the background illumination Unit (j)

- Insert the pins of the background illumination selector into their respective mounting positions above the mirror on the illumination column.
- Insert the fiber optic light guide into the hole on the side of the relay lens unit.

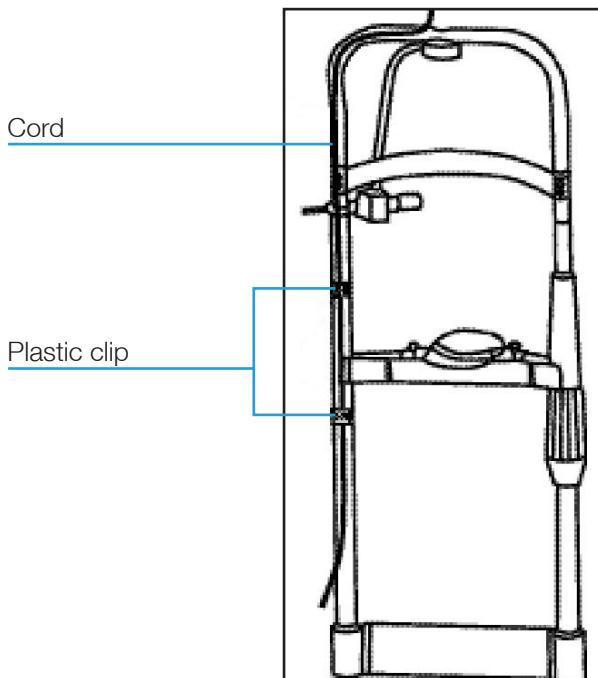


- Tighten the set-screw on the side of the relay lens unit.



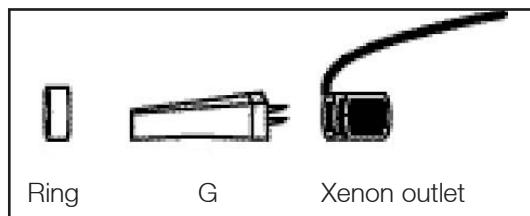
4. Assembling the Xenon relay cord (I)

Remove the four screws from the support rod portion of the chin-rest. With the plastic clips route the cord and replace the screws. The end connecting the Xenon relay cord must be long enough (about 40 cm) so that the other end connects to the power supply relay cord.

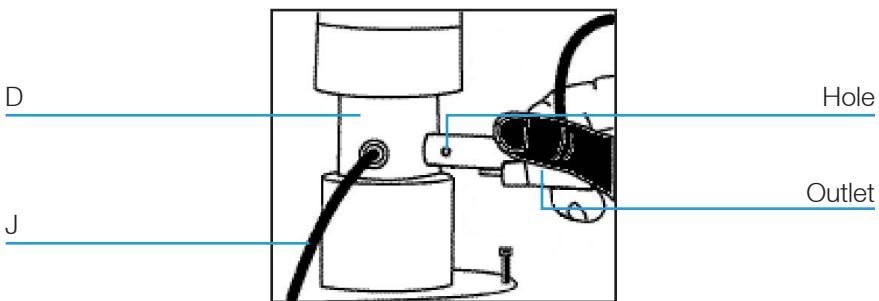


5. Assembling the Xenon lamp (G)

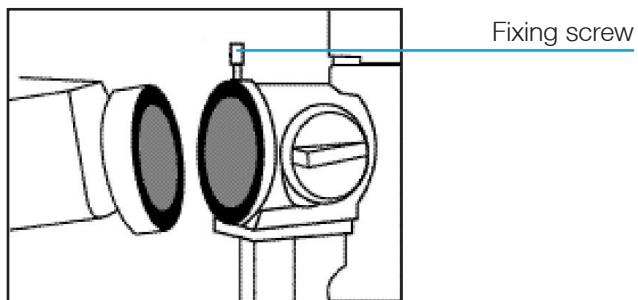
- Remove the chrome ring from the end of the Xenon outlet. Insert the Xenon lamp, and secure it with the chrome ring.



- Insert the Xenon lamp into the square cord in the side of the relay lens unit (D) in the up direction so that the opening in the flash housing will be facing the background illumination bundle.

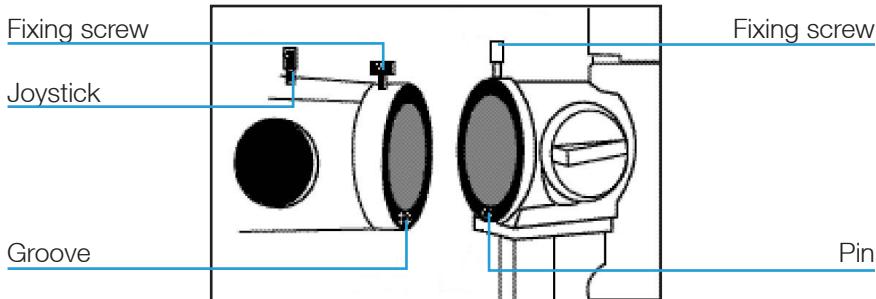


- Mount the lamp assembly as shown. Reassemble the binocular tube and fasten the tighten the set screw.



6. Assembling the beam splitter (E)

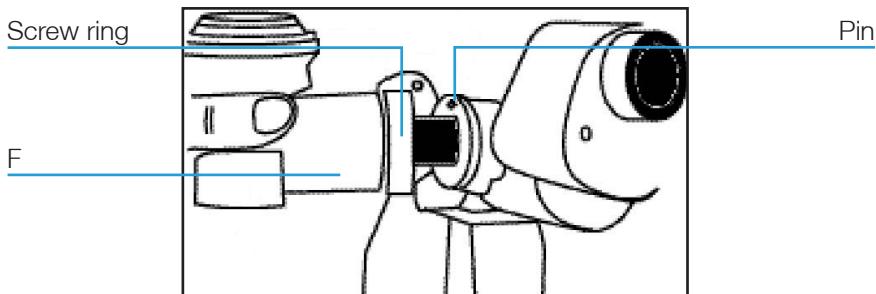
- Loosen the fixing screws and remove the binocular head.



- Align the pin on the microscope body with the groove on the beam splitter.
- Tighten the fixing screw to secure the beam splitter to the microscope body.
- Using the previous orders of steps, reassemble the binocular head and tighten the fixing screw.
- When you need to split the beam, please set the joystick of the beam splitter to the “In” position.

7. Assembling the special lens for photography (F)

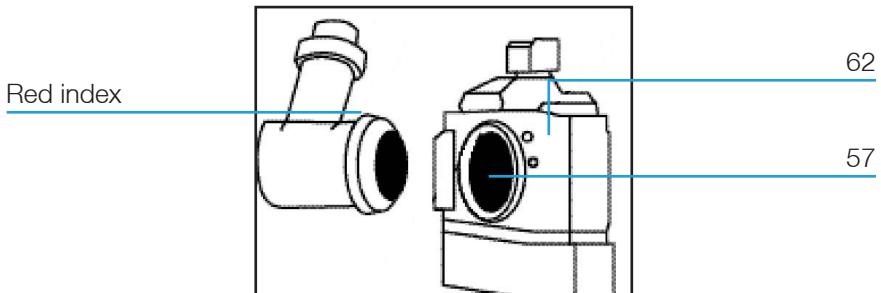
- Remove the protective covers on the right of the beam splitter and on the special lens.



- Align the groove on the port of the lens with the pin of the beam splitter and insert it. Tighten it with the screw ring.
- If you want to remove the special lens, reverse the order of the steps above.

8. Attaching the camera

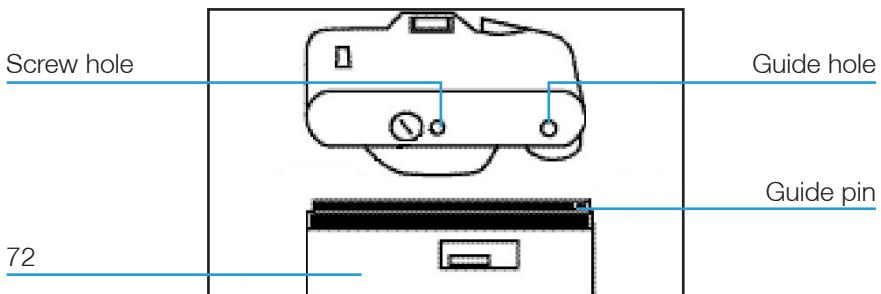
- While pressing the lens-release button, turn the camera body counter clockwise as far as it will go, then lift out the lens blank.



- Align the red index marks on the special lens (F) with the red mounting-release index (57) on the camera's body, then turn the lens clockwise until it locks in position with a click.
- When removing the camera body, you must hold it with your hands, and press the lens mounting-release button, turn the body counterclockwise as far as it will go, then take it out of the mount.

9. Assembling the Motor-drive

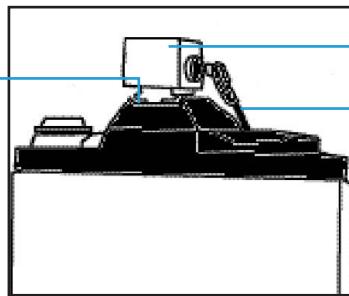
- Set the power switch of the camera and the motor-drive to "OFF". Insert the guide pin at the top of the motor-drive into the guide hole on the bottom of the camera.



- Align the groove on the port of the lens with the pin of the beam splitter and insert it. Tighten it with the screw ring.
- Align the clamp bolt (72) with the screw hole of the tripod at the bottom of the camera, and fasten it.

10. Assembling the Xenon relay cord (I) and synchronizing line (K)

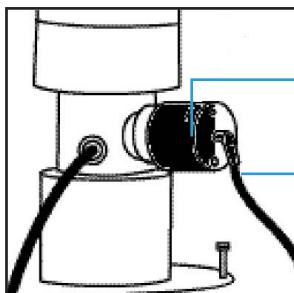
58



I

K

- Insert the Xenon relay assembly into the accessory socket (58) on top of the camera.
- Connect one end of the synchronizing cable to the socket on the Xenon relay assembly.
- Connect the other end of the synchronizing cable to the socket for the relay cable.



Plug

K

11. Assembling the remote shutter line (M)

- Screw one end of the remote shutter line into the remote cord socket (63).
- Place the other end of the remote shutter line near the operation knob.

6.4 Inspection Procedure

1. Checking power plug

- The instrument is supplied with a 3 wire plug please select proper power outlet matching it.
- Make sure that the power supply is properly grounded.

Important Matters

Please use the special power cable supplied with the instrument.

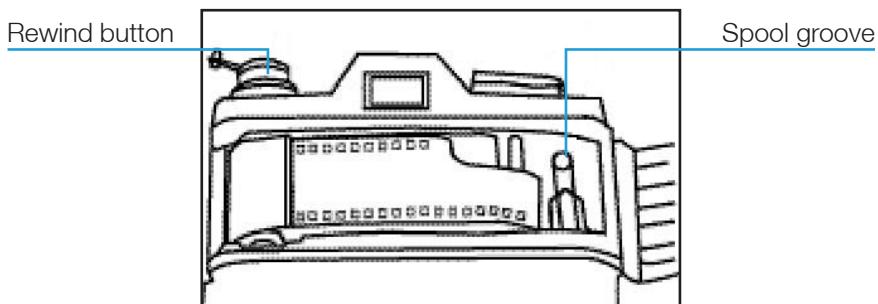
2. Checking the camera, motor-drive and photographic power supply.

- Check whether the batteries have been installed in the camera and the motor-drive.
- Turn on the camera and motor-drive power switches.
- Turn on the photographic system power switch and ensure that the pilot lamp and the charge lamp have illuminated.
- After the charge lamp illuminated, press the remote shutter button and ensure that the Xenon lamp flashes and the motor-drive operates.
- Check the beam splitter, set the joystick at the “IN” position, so that the light shines into the camera. Now, the image light from the lens is dim. For non-photographic use set the joystick to the “OUT” position.
- Turn the power switches off after finishing the inspection.

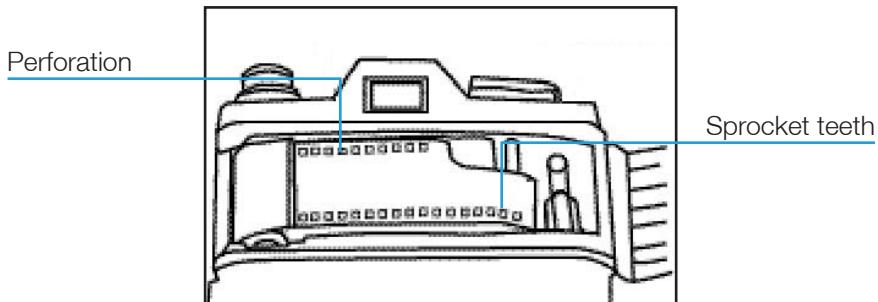
6.5 Operational procedure

6.5.1 Loading film

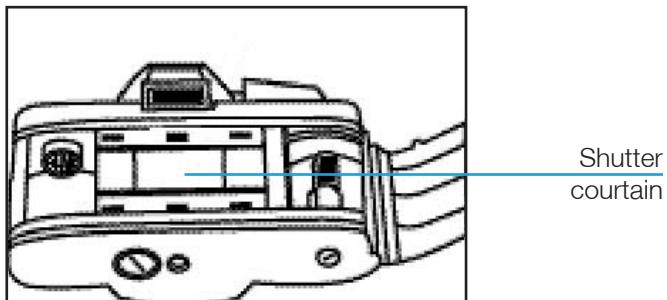
1. Open the camera and turn the motor-drive switch on. To prevent the film from advancing, do not touch the shutter release button.
2. Lift the rewind knob to open the camera.
3. Place film spool in chamber while keeping the rewind knob lifted.
4. Lower the rewind knob while turning it, so that film spool may be engaged with the groove at the bottom of the rewind knob.



5. Pull out the film leader and insert it in the spool groove. Engage film perforations with sprocket teeth, then press shutter release button (37), the film will be advanced automatically. Do not touch the shutter curtain.



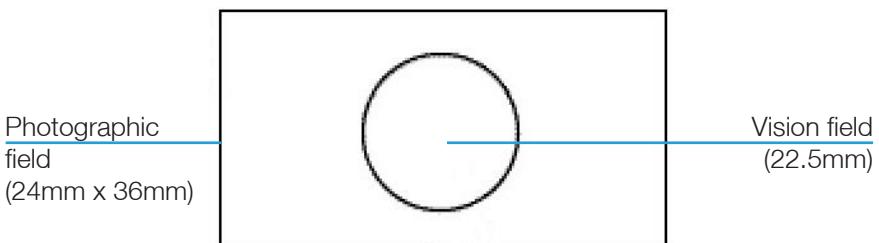
6. If manual film advance is desired, be sure to turn the motor-drive off.
7. Ensure that film is not slack and spool is in place, if it isn't, turn rewind crank clockwise until it stops, correctly tensioning the film, and repeat steps 5 and 6.
8. Make sure that the film is taut and then close the camera back cover.
9. If the rewind crank turns counterclockwise each time film is advanced, the film is correctly loaded. If not, repeat film loading procedures as the perforations may not have engaged with the sprocket teeth.



When film is loaded, frame counter (54) will be illuminated. This is useful to check the numbers of exposed frames in the order S, 1, 2, --36, and E. Release shutter (55) until frame counter shows "1".

6.5.2 Photographic magnification and field of view

- The following table lists the relation between microscope magnification and photographic magnification.
- The field of view show in the ocular is synchronous with the field of photography.



Important Matters

In view of the low magnification at 6X, photography is not recommended due to insufficient magnification and insufficient illuminated range.

Microscope Magnification	Photographic magnification
6X	Impossible
10X	1.0 X
16X	1.6X
25X	2.5X
40X	4.0X

6.5.3 Exposure Setting

Determination suitable exposure values is based on the following:

- What portion of the eye is to be photographed and what magnification ratio is to be used.
- Which of the illumination systems is being used: slit illumination, slit and background illumination, or diffusion lens illumination.
- Xenon lamp intensity
- The table on the next page lists the values for a normal eye with a brown iris when using ASA 200 film.
- In actual use, the photography conditions vary according to the situation. For instance, in many situations the subject may have an abnormal eye, the iris color may not be brown, the slit illumination width may be different, and the area to be photographed may be different. Calculate suitable exposure value for the patient based on the table on the next page.

Photographic Magnification (microscope magnification)		1.0X (10X)	1.6X (16X)	2.5X (25X)	4.0X (40X)
Cornea Crystalline lens (Slit width 0.1 mm)		4	5	5	
Anterior portion	Background illumination H	4	4		
	Diffusion lens illumination	2	2		
Iris	Iris Full Slit Aperture Illumination (9mm)			1	1
	Diffusion lens illumination		2	3	
Conjunctiva	Background illumination H		3	4	
	Diffusion lens illumination		1	2	2

Important Matters

The gray areas in the table indicate that the photographic combination of conditions is not suitable.

6.5.4 Precautions for photography

Once the area to be photographed and the exposure setting are determined, focus the image and press the shutter release button. Simultaneously the Xenon lamp flashes. After the exposure, the motor- drive automatically advances the film frame.

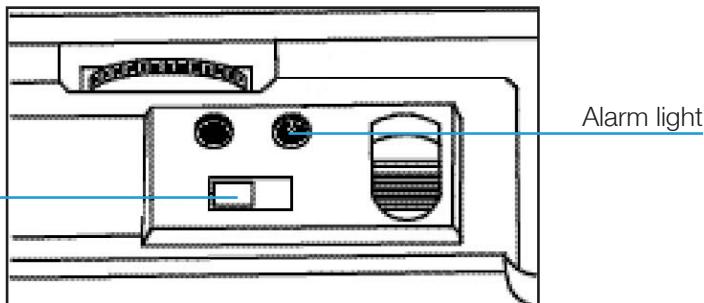
- When photographing the cornea or lens use background illumination settings are as follows:
 - H - Maximum background illumination is provided to entire area in the photographic frame.
 - L - Background illumination is approximately half of the "H" setting
 - O- (Fully occluded) only the slit image will appear on the picture.
- When doing anterior photography of the iris and conjunctiva, focus by widening the slit. Once the area to be photographed is properly focused, return the slit to the original size and activate the shutter.

- When the diffusion lens is being used set the slit size to full aperture (9mm) and set the background illumination setting to the occluded position.

6.5.5 Precautions

- Set the joystick of the full frame attachment at the “IN” position.
- Failure to correctly adjust the diopter setting of the oculars may result in out of focus photographs.
- Always ensure that the charge lamp is illuminated before pressing the shutter release. Charge time is approximately 6 seconds.

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- Only the image from the right ocular is used for photography, therefore carry out the alignment and focusing using only the right ocular.
- When the microscope and the illumination arm are placed in a straight line (0) the picture may be obstructed and a shadow may be caused by the long mirror, shaft or, diffusion lens.
- Avoid changing the flash intensity selection when the Xenon lamp is activated or when the power supply is being charged.
- Always check the number of available frames, when all frames have been exposed, the alarm lamp will illuminate. Turn the motor-drive switch (76) off, rewind the film and then remove the exposed films.

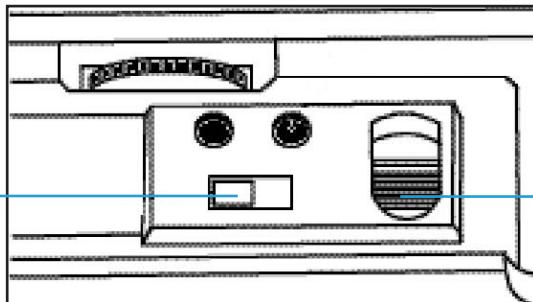
6.5.6 Removing the film

Important Matters

If the film sprocket holes are damaged, the film may not advance. Multiple exposures may be made on the same frame.

- The alarm lamp lights when the film is exhausted. Turn motor-drive switch off, and check film frame number. When frame counter shows the last frame (usually 24 or 36), film advancement will stop.

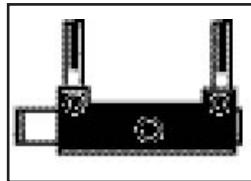
76



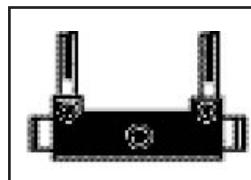
75

- Push the rewind button up (75).
- Raise rewind crank and turn it clockwise until the film rewinds into the film cartridge.
- Pull the rewind knob up and open the back cover. Note that the frame counter returns to "S".
- Remove the film.

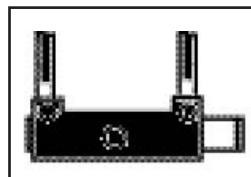
3. Background illumination



High intensity
(Move to the right end)



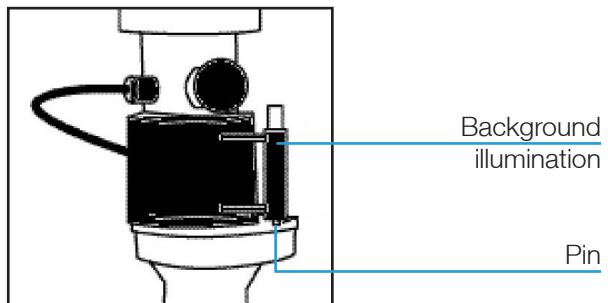
Low intensity
(Click at the center)



Occluded
(Move to the left end)

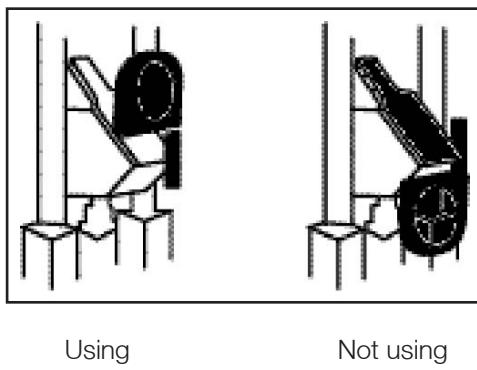
- When using slit photography, the background illumination unit provides 3 settings:
Low, High intensity and, Occluded.
- If the illumination is used while the background illumination is in its normal position, ensure the background illumination unit doesn't come in contact with either the lens or the finger supporting the lens.
- To incline the illumination unit, pull out the background illumination unit, insert the pin in the side of the hole.

- In the inclined illumination setting, the background illumination will be directed onto the reflection mirror. Therefore the object will not be illuminated by the device.
- When using background illumination, there is no influence on the observed image. Only the slit illumination will influence the observed image.



6.5.7 Diffusion Lens

- When using the diffusion lens, place it in front of the reflection mirror. If it is not being used, remove it from the optical path.



Important Matters

When using the diffusion lens, ensure there is an approximate 30° angle between the microscope arm and illumination unit. If this is not done, some of the pictures may be shaded because the diffusion lens or illumination support shaft is in the optical path.

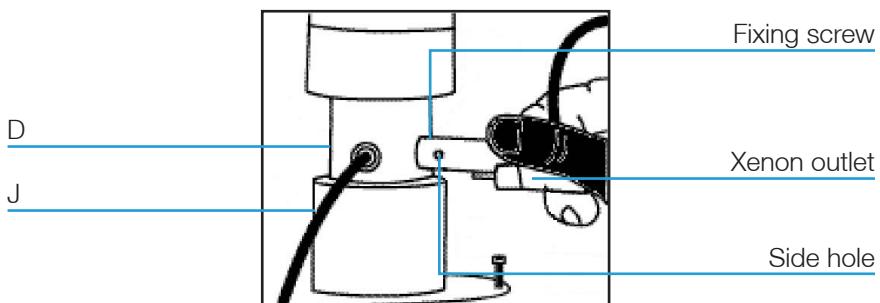
- When using diffusion lens, set the slit size to the full aperture setting, otherwise the illumination intensity will be reduced. At the same time, occlude the background illumination.

6.6 Maintenance

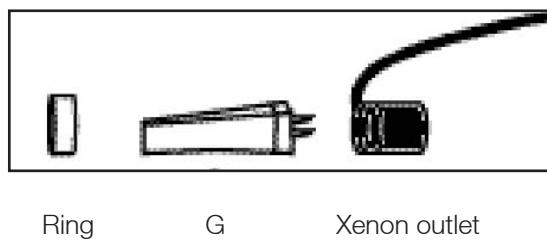
6.6.1 Replacing the Xenon lamp

If the Xenon lamp becomes discolored or sufficient light for photography is not provided, replace the Xenon lamp as follows:

- Turn off the power switch (50).



- Loosen the locking screw at the side of the relay lens unit and pull out the Xenon lamp.
- Remove the chrome ring from the end of the Xenon outlet. Insert the Xenon lamp, and secure it with the chrome ring.



- Replace the locking screw and lamp assemble at its original location.

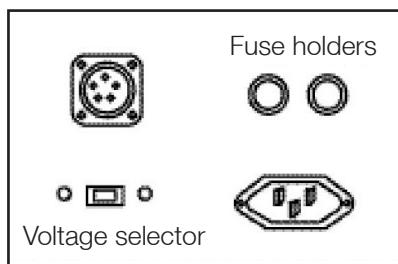
- Do not touch the glass tube on Xenon lamp. Any foreign matter on the lamp such as fingerprints will result in the cloudiness that will shorten its service life.

6.6.2 Replacing the fuse

- Turn off the power switch (50), remove the power cable (H) from the input outlet.
- Remove the fuse holder with the screw driver (U) and take out the fuse.
- Replace it with a new fuse, then retighten the fuse holder.

Important Matters

Use the correct size fuse as follows



110V/125 V T3.15A
220V/250 V T1.6A

6.6.3 Consumables

When ordering the following consumables, please specify names and quantities.

SL 1400 Slit Lamp	Part name	Outlook
	Xenon lamp	
	Fuse T3.15A (110 V) Fuse T1.6A (220 V)	

- When using diffusion lens, set the slit size to the full aperture setting, otherwise the illumination intensity will be reduced. At the same time, occlude the background illumination.

6.6 Maintenance

6.6.1 Replacing the Xenon lamp

If any dust settles on the components of the optical system, remove them using the supplied brush. If any dust still remains, wipe it off using a soft cotton moistened with pure alcohol. Never use a finger or any hard object for cleaning.

6.6.4 Cleaning the optical system

Remove any dust on the lenses or reflecting mirrors by brushing them with the supplied brush. If any dust remains, remove it with soft cotton moistened with absolute alcohol.

Important Matters

Never touch the lenses or mirrors with your fingers or any hard materials.

6.6.5 Trouble shooting guide

In case there is any trouble, please refer to the following table. If the equipment still doesn't work, please contact the Repair Department or an authorized distributor.

Trouble	Possible Cause	Remedy
Shutter does not open	Power switch on the camera is "OFF"	Turn power switch "ON"
	Motor-Drive switch is "OFF"	Turn motor-drive switch "ON"
	Batteries in camera are dead	Replace batteries
	Batteries in motor-drive are dead	Replace batteries
	Shutter release button set wrong	Set shutter release button "S"
No Xenon lamp flash	Service life of Xenon lamp is over	Replace Xenon lamp
	Shutter was released before the charging cycle was completed	Wait for the charge lamp to illuminate
	Synchronizing line is not connected	Connect the synchronization line
Motor-drive does not operate	Motor drive switch is "OFF"	Turn motor-drive switch "ON"
	All film frames are exposed	Rewind and remove exposed film
Photographs are underexposed	Shutter speed is too fast	Set the speed at 1/30 second
	Xenon lamp is cloudy	Replace Xenon lamp
	Xenon lamp isn't properly installed	Check the direction in which the lamp is inserted
	Filter is set to use the ND filter (except when using direct or diffusion illumination)	Set the filter lever to the correct position

Trouble	Possible Cause	Remedy
	Slit size is not set at full aperture, (except when using direct diffusion illumination)	Set the filter lever to full aperture (9mm)
	Charging cycle is not completed	Wait until charge lamp illuminates
	Selection lever for background illumination is out of position	Select the correct position
	Flash intensity set wrong	Set the intensity properly
	Film doesn't match photo sensitivity	Select ASA200 film
Photograph is out of focus	Incorrect diopter setting on eyepiece	Correct the diopter compensation
	Observation and focusing are made using left eye	Use right eye for observation and focusing
Shadows appear on the picture	Foreign material on the lens surface	Clean the lens surface
	Shaft of illumination unit, reflecting mirror, and/or diffusion lens obstructing the optical path	Check the position of this unit
No image on picture	Full frame attachment is set "OUT"	Set it at "IN"
	Film is not loaded correctly	Load film correctly

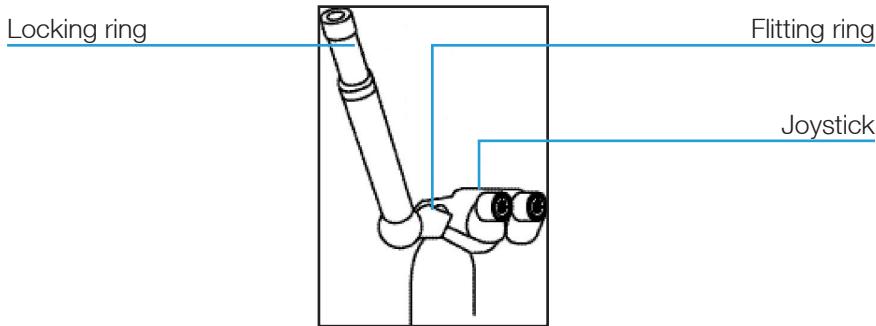
6.6.6 Specifications

Optical axis for photography	Right ocular pathway
Photographic magnifications	0.6X, 1.0X, 2.5X, 4.0X
Camera	SEAGULL DF-300 35 mm
Motor-Drive	SEAGUL F10-11
Background illumination	Light guide illumination 3 – setting
Light for photograph	Pulse Xenon Lamp
Input Voltage	110/220 V + 10%
Frequency	50/60Hz + 1 Hz
Flash power	23J, 47J, 78J, 140J, 240J
Time for charging	<6 seconds
Maximum input power	500 VA

7. Optional Observation Tube

7.1 Features

- The same image can be observed from observation tube as from main tube.
- The observation tube can be attached to either side of the slit lamp.
- The observation tube may be used with the camera.
- An image rotator is built into the eyepiece to provide the co-observer with a correctly oriented image.



7.2 Specifications

Eyepiece: 12.5X

Magnification: 6X, 10X, 16X, 25X, and 40X

Beam splitting proportion: 50:50

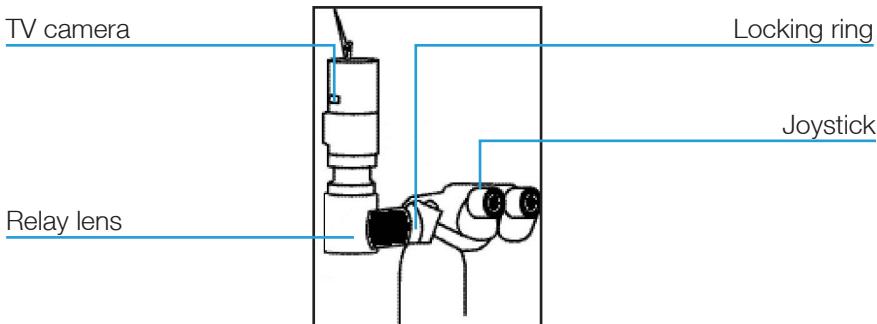
Image rotation angle: 360°

7.3 Assembly

- Attach the beam splitter (Refer to page 24)
- Remove the protective cover from the observation tube.
- Match the teeth on the beam splitter with the grooves on the observation tube and insert the observation tube securely in position.
- Rotate the ring to lock it in place.

7.4 Use Instruction

- The tube can be set to a position convenient to the co-observer by raising the locking ring. The tube will rotate 360° along its mounting axis.
- After adjustment, release the locking ring.



8. Optional TV Accessories

8.5 Features

- Provides demonstration ability to a large audiences
- Allows images to be placed on videotapes

8.6 Specifications

Magnification		
Observation Mag.	TV relay Mag.	TV Field of View
6X	0.1X	21.75 X 29.0
10X	1.0X	13.9 X 18.56
16X	1.6X	8.7 X 11.6
25X	2.5X	5.44 X 7.25
40X	4.0X	3.68 X 4.64

Aperture Continuously variable

Recommended TV camera size 1/3 inch

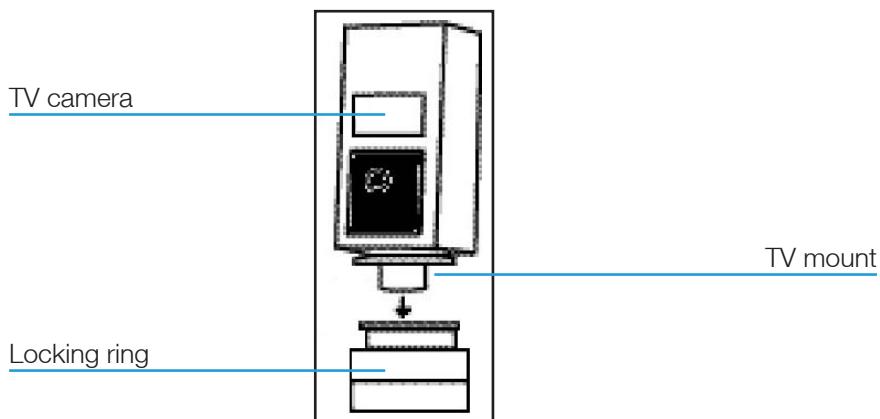
Mount C-mount, Canon YC-05II

8.7 Setup

Adjust the diopter of the eyepieces.

8.8 Assembly

- Attach beam splitter (Refer to page 25)
- Remove the protective covers in both sides of the relay lens.
- Align the teeth on the beam splitter to the grooves on the relay lens, insert the relay lens securely, rotate the locking ring to secure the beam splitter.



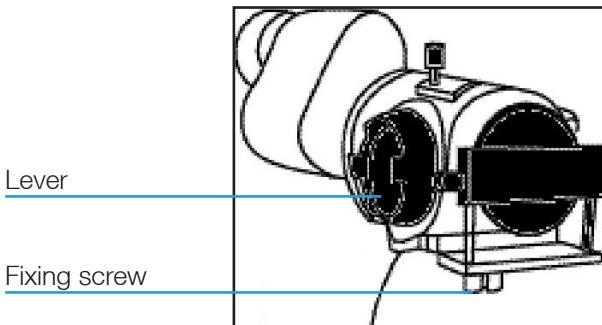
- Loosen the locking ring on the relay lens, and remove the TV mount.
- Attach the TV mount to the TV camera.
- Insert the TV camera and mount into the relay lens, with the camera base facing you lock it with a locking ring.

9. Optional Barrier Filter

9.1 Features

- Provides a high contrast image

- Provides ability to observe and photograph the anterior section of the eye using fluorescence



9.2 Specification

Separation wavelength: 520nm

9.3 Assembly

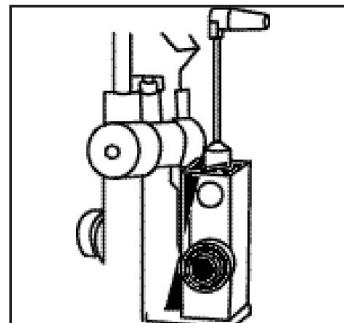
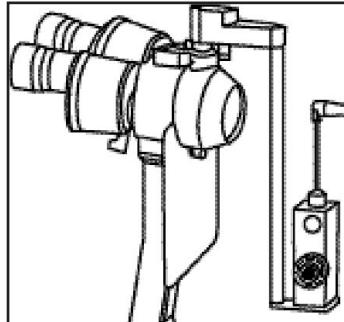
- Use set screws to mount the barrier filter.

9.4 How to use

- Rotate the eyepiece adjustment ring and adjust the diopter compensation.
- Set the beam splitter lever to "IN".
- Proper exposure will depend on the magnification and the subject, make adjustments as necessary to the illumination with the aperture lever of the relay lens and the brightness control switch of the power supply unit.
- Apply fluorescent agent to the patient's eye.
- Insert a blue filter

10. Applanation Tonometer

The LSL 1400 slit lamp can be equipped with YZ30R, Haag-Streit AG Model R-900 or model T-900 applanation tonometer for measuring intraocular pressure.



- Loosen the locking ring on the relay lens, and remove the TV mount.
- Attach the TV mount to the TV camera.
- Insert the TV camera and mount into the relay lens, with the camera base facing you lock it with a locking ring.

11. 12.5x measuring eyepieces

11.1 Features

You may replace the standard eyepieces the optional eyepieces that include reticles for measurement of length and angle.

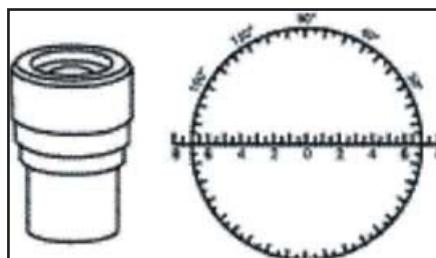
11.2 Specifications

- Scale specification

Length scale	16mm (0.5mm graduations)
Angle scale	360° (5° graduations)

- Measuring parameters

Length scale	To be used at 10x only
Diopter compensation	-5D to +3D
Angle scale	No limitation



12. Responsibility

We will supply the circuit diagram, electrical component list, drawing annotation and calibration instructions according to each customer's needs. If additional information is required please contact us.

13. Transportation

During transportation, the instrument must be protected it from moisture and strong vibrations. Do not transport the instrument upside down. Relative humidity should be maintained between 10 to 90% RH. Temperature should be maintained between -25°C and 40°C. This instrument should be stored in a well ventilated room free of corrosive gasses where the relative humidity is between 10 to 80% RH and the temperature is between -10°C to 40 °C. If the assembled instrument is to be moved or transported a short distance, please lock all the moveable parts. Move the instrument carefully. If the instrument is to be moved a long distance it must be repacked in its original packaging.

14. Specifications

Microscope	
Type	Galileo, magnification changer with stereoscopic head
Model of magnifying	5 steps via ring rotation
Eyepiece	12.5X
Total magnification	6X, 10X, 16X, 25X, 40X
Field of view	(33mm)(22.5mm)(14mm)(0.8mm) (5.5mm)
Range of PD adjustment	55mm to 75 mm
Diopter adjustment	-5/+3D
Illumination	
Slit projection magnification	2/3X
Slit width	continuous from 0mm to 9 mm. (at 9 mm, slit becomes a circle)
Slit height	continuous from 1 to 8 mm
Aperture diameter	9mm, 8mm, 5mm, 3mm, 2mm, 1mm, 0,2mm
Slit angle	0° to 180° continuously adjustable from vertical to horizontal
Slit inclination	5°,10°,15°,20° (four steps)
Filter piece	Heat absorption, gray, red-free, and blue
Illumination bulb	12V30W halogen bulb

Movement base	
Fore and back movement	90mm
Left and right movement	100mm
Fine movement	15mm
Vertical movement	30mm
Chin – rest parts	
Vertical movement	80mm
Fixation target	Red Led
Hruby Len	
Hruby Lens	-58.7D (optionally available in some regions)
Power source	
Input voltage	100/220V + 10%
Input frequency	50/60 Hz +/- 1 Hz
Input power	58 VA
Output voltage	Illumination bulb 7.2V, 9.8V, 11.6V Fixation target : 7.2V
Electreical safety standard	Conform to Standard IEC601- 1, Class I Type B
Dimension and Weight	
Packing box	720mm x 495 mm x 480mm
Total weight	24 Kg
Net weight	21 Kg

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